

# THE IRON AGE

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## Machine Molding in a Jobbing Steel Foundry

The Sivyer Steel Casting Company's Plant  
Equipment and Methods Illustrative of  
Progress in Manufactured Steel Castings

BY O. J. ABELL

Notably a development of the last decade, the manufacture of steel castings for common use has grown in spectacular fashion. Manifestations of the rapid increase in the demand for the product of the steel foundry are everywhere at hand, in the number of steel foundries and in the astonishingly short intervals elapsing between successive enlargements of the individual plants. A typical example

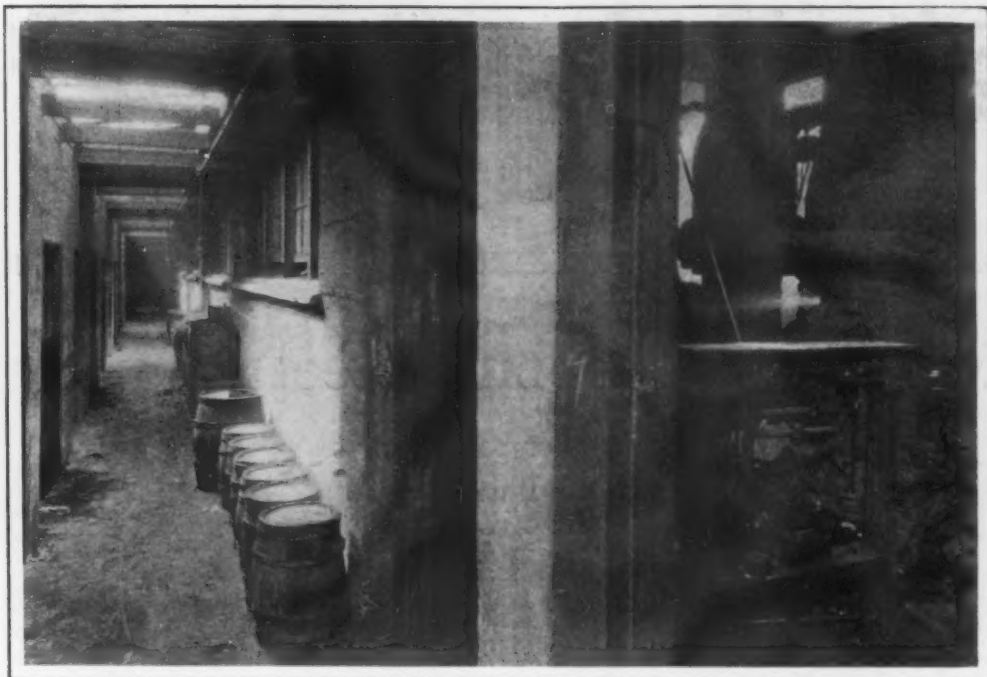
Nor is this foundry representative only of the quantitative evolution of the steel castings industry. The change from melting in crucibles and the ascendancy of the converter, and more latterly the electric furnace, are here illustrated by concrete example. The original foundry with a possible output of 75 tons monthly was equipped with ten oil-burning crucible furnaces. Of these furnaces all



Cleaning Room with Its Wood-block Floor, Showing Location of Cleaning Tables, Tumbling Mills, Sand Blast and Annealing Oven

of this rapid expansion is found in the Sivyer Steel Casting Company, Milwaukee. In a period of six years the output of this company's foundry has multiplied at such a rate as now to engage all the facilities a floor space of approximately 54,000 sq. ft. and equipment of advanced type afford, as compared with the output of a frame-housed floor area of 9000 sq. ft., conducted practically by hand, the status of the foundry when it was started in May, 1910.

but one have been dismantled, and that one is limited in its operation to the melting of alloys and the heating of pots. Meanwhile a Tropenas side-blow converter of one-ton capacity has become the main dependency of the foundry and with a consistent average of 23 to 25 blows per day is making 675 tons of steel per month. A 3000-lb. Snyder electric furnace, with a basic bottom, has now been installed and is being used to supply steel for the



The Convenient Relation of The Concrete Storage Bins to the Cupolas

manufacture of the smaller castings. From this furnace a monthly production of 250 tons is expected.

The accompanying floor plan indicates the present layout of this foundry, and by means of the heavy dotted lines and corresponding dates the successive stages in its expansion. From this a general idea may also be had of the foundry equipment and railroad facilities of the plant for receiving raw materials and shipping castings. The plan does not show the two 5-ton Pawling & Harnischfeger cranes in the main foundry bay and the 3-ton crane in the cleaning room which appear in the accompanying general views, and constitute the primary means of handling the heavy castings and materials. The original foundry floor space is now used almost entirely as a core room with an area at the far end for storage purposes.

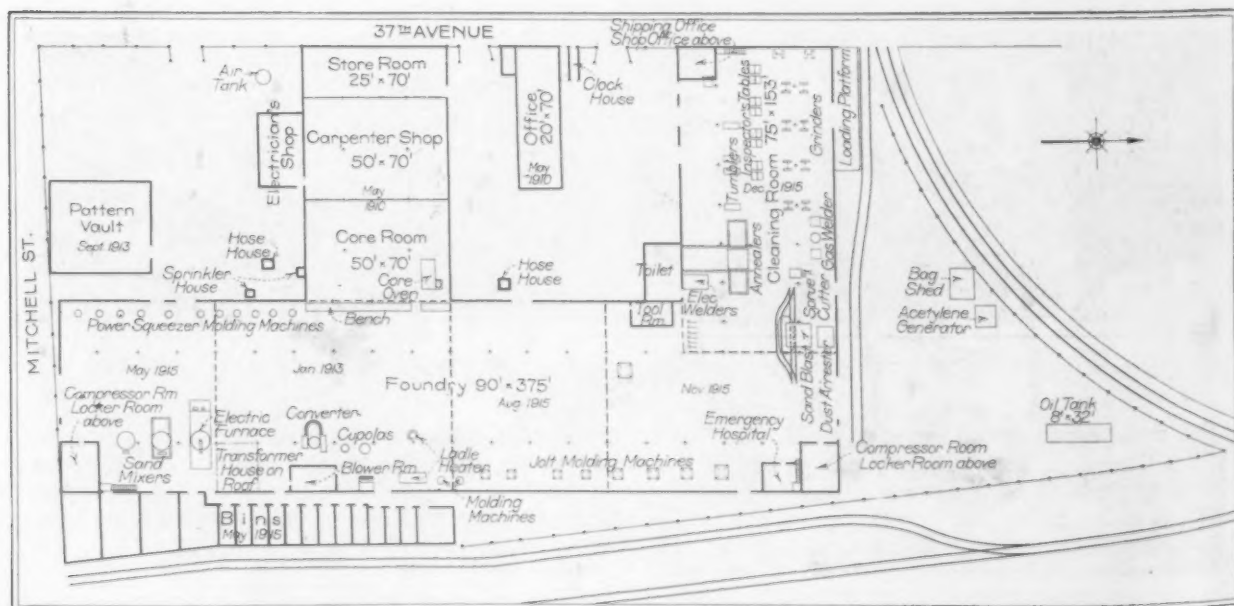
The arrangement of the main foundry floor provides for making up the smaller molds at the end farthest from the cleaning room and immediately adjacent to the electric furnace. In front of the

be continuously in a forward direction as far as possible.

The exceptions are so few that it may be said that, although distinctly a jobbing shop, nearly all of the molds are made up on machines, a practice markedly exceptional among steel foundries. The machines are located in general as indicated in the floor plan, in one or two instances a jolt-ramming machine being apart from the general group of machines where it is more accessible to the floor on which certain work is being put up. The machine equipment includes both Tabor and Herman jolt rammers, Tabor power squeezers, Adams-Farwell hand squeezers (for the smaller patterns) and Pridmore stripping plate machines.

The treatment of the problem of patterns has much to do with the success this company has had with machine molding. Generally speaking, the work taken by the jobbing foundry would not permit of mounting the patterns for machine molding, certainly not if metal patterns or matchplates were attempted. While some metal patterns mounted on

converter and cupolas an open space is reserved for the handling of the hot metal and for the shaking out of the larger molds. The molds are not shaken out where poured, but are picked up with the crane and carried to the middle or the cleaning room end of the foundry where the sand is accumulated in large heaps. These larger molds are made up and poured at the end of the foundry nearer to the cleaning room, in the natural order for the movement of the materials in process to



The Dates on the Plan Show the Progressive Expansion of the Siver Plant

boards are used in this foundry where an order provides a sufficiently long run, the general practice is to use hardwood patterns, which are mounted after they come to the foundry on boards that are made to serve as the character of the work requires as a followboard or as a substitute for a matchplate. This expedient is entirely successful and involves no greater cost than is commensurate with the job. The company also gives particular attention to the question of properly made patterns, consulting with its customers before the work in the foundry is undertaken.

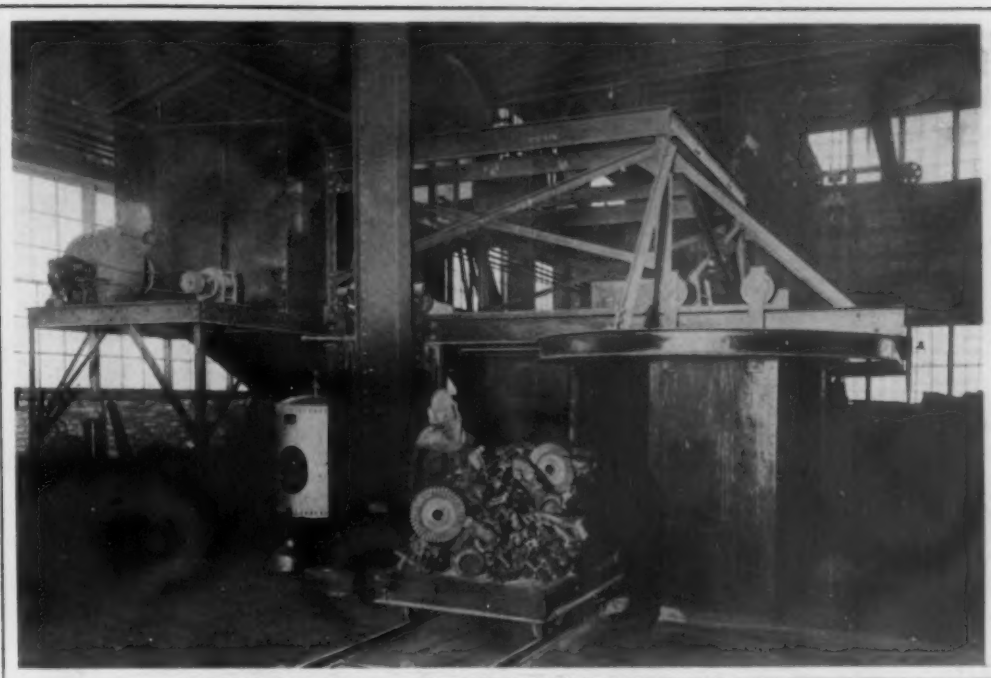
As stated above, the melting equipment includes a 1-ton converter with a cupola lined to 38-in. diameter, one smaller cupola as a spare, and the electric furnace. Raw materials for charging the cupola and for making and repairing cupola and converter linings are received into and used from a row of concrete-covered bins which parallel the main foundry building on the side of the cupolas, extending between the foundry and the receiving railroad tracks. The storage yard for pig iron extends beyond these bins. One of the cuts shows the storage bins and the gangway for trucking materials with its relation to the melting units.

The practically continuous operation of the converter resulting in as many as 25 blows per day, and the practice upon which it is dependent, was described in *THE IRON AGE* of Dec. 3, 1914. This rapidity of operation was obtained through the use of an entire ganister lining, following an experience for a period in which only eight to ten blows

per day were obtained with the ordinary silica brick lining.

The very short interval between blows calls for a system of handling hot metal from the converter which will avoid delays. The blown metal is poured into a large ladle, which takes the entire heat, the ladle then being transferred by cranes to a stand a short distance from the converter, where it is set down and where the slag is skimmed off, preparatory to transferring the metal to small ladles. In the meantime the converter is turned completely over, the slag dropped and the converter made ready for the following charge, in which interval the crane, released from the previous ladle after it has been set down on the stand, picks up another ladle of cupola metal, which is brought to the converter and charged into it. The blow has a duration of from 23 to 26 min. All of the steel is treated with titanium in the ladle, the ratio being 4 lb. to the ton.

The electric furnace has been lined to make basic steel, and the scrap from the converter steel castings is being charged into the electric furnace while

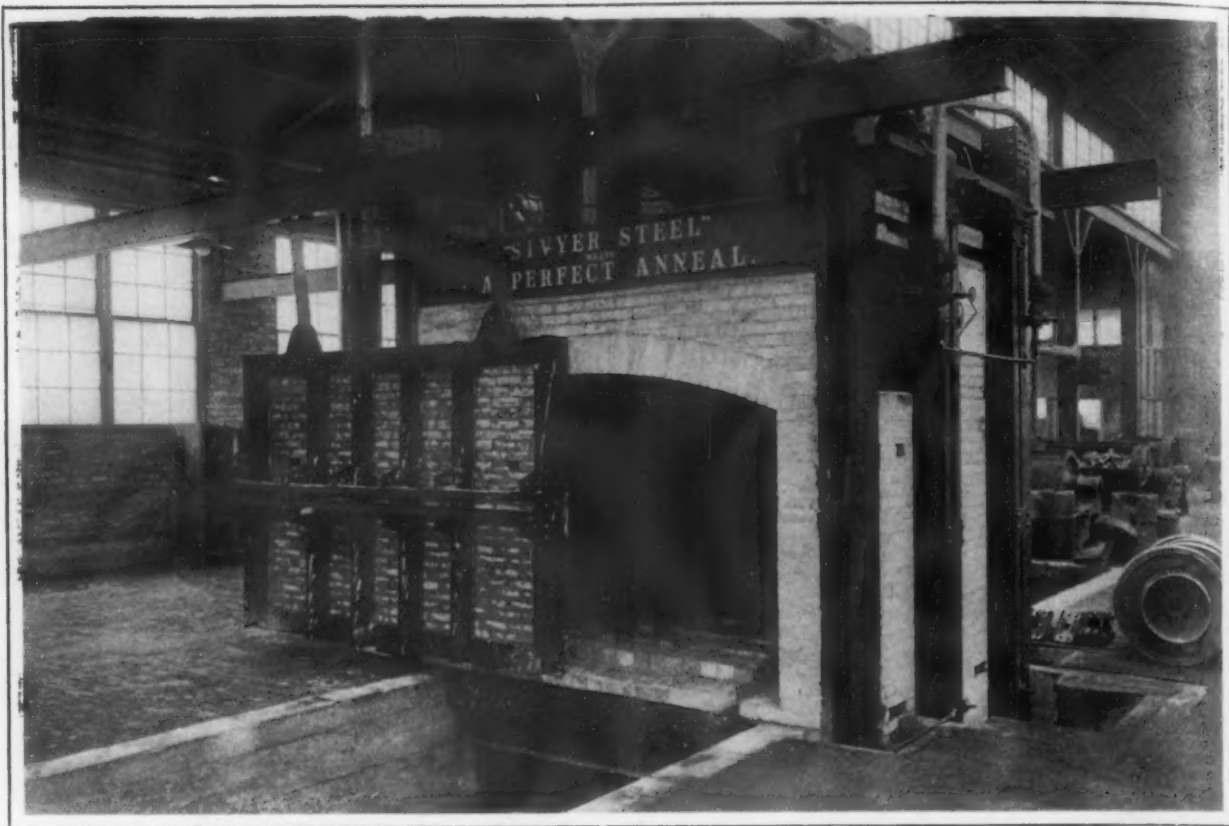


The Sand-Blasting Equipment Located at the Foundry End of the Cleaning Room



The Main Section of the Foundry Looking Toward the Cleaning Room End





The Continuous Oil-Burning Annealing Oven with Door Designed Especially to Prevent Loss of Heat

the scrap from the electric furnace castings, refined, as it is, well within the limitations of acid steel scrap, is admirably adapted for charging into the cupola which melts down the metal for the converter.

For the mixing of sand a Simpson intensive

mixer is installed in connection with a novel arrangement for handling the sand. A large hopper or scoop hinged at its discharge end at a height corresponding to the top of the mixer pan inclines downward with its open end resting on the floor. The sand can thus be dumped into it from wheel-



The Castings from the Tumbling Mills Are Assembled for Shipment on the Sorting Floor in the Cleaning Room and Convenient Racks Serve for Temporary Storage and Separation



barrows, after which the hopper is swung upward like the apron of a concrete mixer, discharging the sand into the mixer.

Attention has been given to the arrangement and equipment of the cleaning room in an exceptional degree, and the finishing of the castings is correspondingly painstaking. The room is 75 ft. wide and 153 ft. long and lays its first claim to the unusual in its wood block floor, furnished by the Ayer & Lord Tie Company. At the end, opening from the foundry, the castings are delivered at once to the sand blasting room. In connection with this, provision is made for cleaning castings piled on a truck, for which suitable trackage through and around the sand blast is provided, as indicated in the floor plan, or suspended from the overhead trolley loop which passes through the sand blast chamber. The equipment is a combination of the standard type of room built by the W. W. Sly Company with the Pangborn sand-blasting machine.

Opposite the sand blast and also at the extreme end of the cleaning room is a battery of six hack saws, where the gates and sprues are removed. A vertical power sprue cutter is also installed near the delivery side of the sand blast. Here the castings have their first of three thorough and routine inspections, so that rejections may be made of any material which shows obvious defects before additional labor is put on it. Both gas and electric welding equipment is at hand for remedying surface blemishes or other faults which may be properly rectified in this manner.

It is the practice in this foundry to make a trial casting on every order of more than 50 pieces. This trial casting is sawed through wherever the cross-section may be expected to show faults. If defects appear the necessary changes are made in the pattern or the method of molding such as will insure a sound casting. If necessary in cases of especially difficult castings, a second trial casting is made and when found satisfactory establishes the standard practice for making that casting. The inspection also, as a matter of policy, particularly concerns itself with the detection of defects likely to appear only after machine work has been done on the casting. In keeping with the same policy all gears are put on the grinder and the rough spots in the teeth completely removed. In short, the grinding and chipping is pursued to a degree which finishes the surface of the casting ready for service except where machining is required.

The manner in which the annealing oven has been installed scarcely needs description, in view of an accompanying illustration. Its location is indicated in the floor plan and in the general view of the cleaning room. The superstructure of the oven is exceptionally heavy, both in the brickwork and the structural steel framing with which it is tied together. This superstructure straddles a long pit in which a track is laid. The pit is long enough to accommodate easily a platform truck outside of the oven at either end and is deep enough so that the

truck platform is at a level with the cleaning room floor. The sliding doors which span the full width of the oven at each end are of equally heavy construction with the oven, and are hung on beams which extend from the oven to the building so that the doors can be swung entirely clear of the oven.

The manner of effecting a tight joint when the oven is closed up is of special interest. As will be seen from the illustration, the truck platform is laid with firebrick in a steel binding, and is long enough so that when the door is set in place it makes a tight joint with it, brick to brick. It can also be



Clipping and Inspecting Table with Swinging Steel Curtain to Stop Flying Chips and Yet Permit of Easy Shifting of Casting from One Side to the Opposite

seen that along the sides of the truck there is a half-round trough which interlocks with the leg of a special casting which projects down into it, the angle running the length of the oven. The trough is filled with enough sand to serve as a luting, and in consequence a sealed joint is effected. The offset of the concrete wall of the pit under the truck overhang can also be seen.

It is apparent that with this arrangement of the annealing furnace, one truck loaded with castings may be prepared while the other is in the oven and vice versa, the other truck unloaded and refilled while the first is in the oven. It is the practice here not to hold the castings in the furnace until they have cooled down, but to remove them as soon as the temperature of the oven falls below the critical point for the steel. This obviously is a great time-saver, and results in practically continuous annealing. The oven is oil-burning.

The cleaning room equipment includes grinding machines which extend in a double row from the middle of the room to the far end along one row of columns, a row of inspectors' tables in the center and tumbling mills along the opposite line of columns. The grinding machines are individually motor driven and the exhaust is taken off in conduits below the floor. The inspectors' tables also incorporate new ideas. They are strongly built with a structural steel framing and hardwood table. The table, as shown in one of the illustrations, is

(Continued on Page 1118)

# The Rennerfelt Electric Arc Furnace\*

Its Peculiar Arc Flame—The Low Electrode Consumption and Easy Regulation—Efficiency, Power Factor and Consumption for Various Metals

BY C. H. VOM BAUR

The Stassano furnace was the forerunner of the Rennerfelt. The former started with a radiating arc, playing almost horizontally over the bath, whereas the latter furnace forces the naturally large arc flame violently down on the charge and away from the roof by employing a different method of electrode arrangement. Polyphase current of any frequency and voltage is used.

The advantage of a solid bottom has long been recognized, and the extensive use (33 in operation and 20 building) which this furnace has been put to in less than four years, is largely due to this

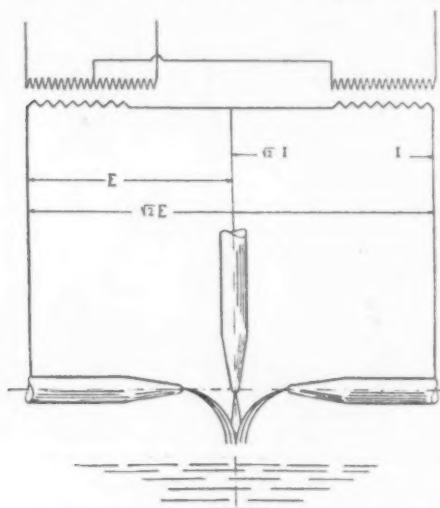


Fig. 1—The Electrodes and Connections of the Rennerfelt Electric Furnace

feature in conjunction with the first-mentioned characteristic. The Rennerfelt furnace idea is shown diagrammatically by Fig. 1.

The almost universally used three-phase current enters the transformers and is changed by means of Scott connection to two-phase three-wire system. The middle or combined conductor carries about 40 per cent more current in the vertical than in either of the side electrodes, and this forces the entire large radiating arc, by the resolution of forces and electromagnetic action, down on the bath. This form of arc has hitherto been unknown in electric furnaces. The horizontal electrodes are about 15 in. (38 cm.) above the bath or slag, in some of the larger size furnaces, and the operating distance from tip to tip of the horizontal electrodes is usually from 18 to 22 in. (45 to 55 cm.) or more.

These dimensions give an idea of the size of the flame, which, striking the bath, mushrooms to the sides and ends of the furnace. The heat reaching the roof is consequently very indirect, thus favoring low roof-maintenance costs. These low roof-refractory costs have often proven themselves in practice; for instance, when melting cold steel scrap and making tool steel quality, heats taking 5 to 6 hr. in a low-power furnace, at about 150 kw. per ton capacity of the furnace, the roof has lasted 192 heats with a 9-in. (23 cm.) brick. With faster

melting and the 12-in. (30 cm.) brick, more heats could be expected per roof.

The furnace is built in different sizes. The first 30 furnaces were 3 tons and under capacity. Since then, a 4-ton has been placed in operation and a second is expected to follow shortly. Eight-ton furnaces are building, while 12-ton and larger furnaces are being contemplated. Rennerfelt believes that with the multiple arc system, as years ago proposed in principle by Stassano, electric furnaces of 40, 50, and even 75 tons capacity can be made and operated to give satisfaction. This type of multiple arc furnace is shown by Fig. 3. A 40-ton furnace, for instance, would have four sets of electrodes of three each, the side electrodes 6 in. (15 cm.) and the top 7 in. (18 cm.) diameter, the furnace taking 4800 kw. at the terminals. The inside diameter would be about 7½ ft. (230 cm.) and the hearth proper about 14 ft. (420 cm.) long.

## ELECTRODE REGULATION AND CONSUMPTION

On account of its peculiar characteristic, the Rennerfelt arc is very steady with hand regulation, and the furnace operation is electrically simplified to a marked degree by avoiding all automatic electrode regulation, although motors with push-button control are contemplated. As only 4 or 6 lb. (1.8 to 2.7 kg.) of Acheson graphite are burned away per ton of cold steel scrap or pig melted and treated, it is evident that the electrode regulation with such a steady arc, made between three points of stability, that is, the tips of three electrodes, is a minimum, and this has been proved in practice. The electrodes oftentimes do not have to be adjusted for a half hour, and still the power consumption is about as steady during these periods as with an induction furnace. Light metal scrap or turnings can be heaped in the furnace with the electrodes touching the charge, and yet before many minutes the free-burning arc between the electrode tips has established itself.

All but three or four of these furnaces are operating, or contemplate doing so, with basic bottoms. Only a few operate with acid bottom, and these in tool steel works

where the highest class of raw material is available at reasonable prices. The bottoms of these furnaces last as long as similar solid bottoms of open-hearth furnaces. The sides burn away a little faster and wear away also, due to the slag action, and the roof goes faster than the sides, but lasts as long as previously mentioned.

The wear of the electrodes seems to depend on three things: First, the density of the current;



Fig. 2—The Rennerfelt Electric Arc as it Appears Playing Down on the Bath of Metal from the Three Electrodes

\*From a paper presented at the annual spring meeting of the American Electrochemical Society, at Washington, D. C., April 27, 1916. The furnace was described in THE IRON AGE, Jan. 15, 1914. Mr. Vom Baur is with Hamilton & Hansell, 17 Battery Place, New York.

second, the circular area and length exposed inside the furnace; and third, the amount of air leaking into the furnace. The latter cause seems to have the most deleterious effect and hence doors are fewer now than formerly. Up to the 3-ton size there is only one door and that over the spout, all

The characteristic features of the furnace may be summed up as follows:

1. The heat is generated with an arc with the absence of exceedingly hard strains on the power supply.
2. On account of the steady power and on account of the large flame widely diffused, as shown in Fig. 2

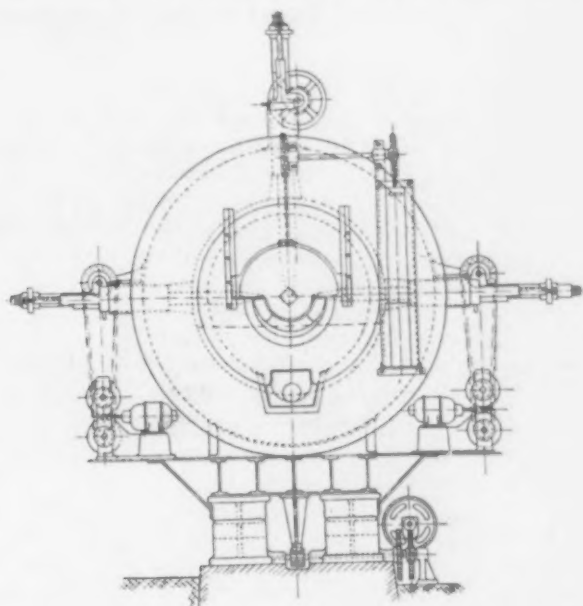
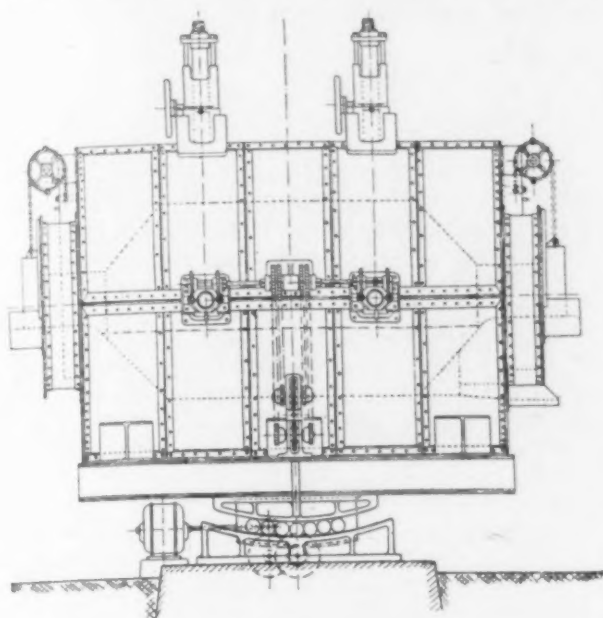


Fig. 3—Side and End Views of a 12-Ton Rennerfelt Electric Steel Furnace Showing Double Set of Electrodes

other furnaces have but two doors and these are much tighter. The clearance of the cooling boxes is also made less. Only  $\frac{1}{8}$ -in. (3 mm.) clearance is allowed, which is just enough room to compensate for the slight irregularity in the manufacture of what are ordinarily perfectly round electrodes.

The electrical conditions are most satisfactory, because of a high power factor, at 50 to 60 cycles, of 90 to 97 per cent. The phase displacement is almost entirely avoided, and the phases are almost perfectly balanced.

The so-called efficiency of electric furnaces depends, as has been broadly discussed by Hering and others, on the rate at which the heat is forced into the furnace, also upon good insulation, proper painting, etc. The main point of these is the rate at which the power is consumed. Three or four years ago 200 kw. was considered ample for a 1-ton furnace; now 350 to 375 for this size is common practice. Consequently the melting time has decreased and the kilowatt hours per ton are less, the cost of the steel in the ladle is less, and the output is correspondingly increased. The practical limit to this high-powering of furnaces is the power of the refractories to withstand the higher heat for sustained periods, the refractories are also subjected to greater differences of temperature between heats, especially with those furnaces where the electric current cannot be maintained while there is no charge in the furnace.

With low-powered Rennerfelt furnaces the power consumption when treating various metals has been:

	Kw.-hr. per Me- tric Ton
Melting red brass.....	168
Melting pure copper.....	197
Melting white iron.....	290
Melting gray iron.....	325
Melting 80 per cent ferromanganese.....	441
Melting steel scrap, not ready to pour.....	455
Melting and "killing" steel scrap on an acid bottom, about.....	600
Melting and refining steel scrap on a basic bottom, about.....	700
Melting 80 per cent ferromanganese and holding, tapping and charging.....	741
Making 67 per cent ferrotungsten, small scale.....	5,730

the heat is communicated to the charge quicker than with arcs of the thin-pencilled type.

3. A large flame or a series of them sweeps all over the major portion of the charge in the center of the furnace, or at regular distances along the major axis and is directed and violently deflected downward.

4. The heat being thrown downward as a radiating arc of large volume, favors higher efficiency, giving the roof a long life.

5. Only one small hole in the short-radius roof for each set of electrodes makes for strength and low cost.

6. The hearth is more easily surveyed and accessible, during operation, than in arc furnaces having electrodes only 2 or 3 in. (5 to 8 cm.) above the slag.

7. With larger furnaces multiple arcs are used, this method starting in with the 6-ton furnace. The heat distribution is markedly better than with arc furnaces of equal size, using the metal to conduct the current.

8. The heat is applied directly, though the arc is not.

9. The heat gradient in an electric arc is greater if it takes place in the widely spread-out heating zone rather than in a narrow space.

10. The radiating arc is a much more rapid way of transmitting heat than the slow heat of conduction of other arcs.

11. There is no water-cooling below the bath, which consequently avoids danger of explosions.

12. The voltage at the arc is from 75 to 100, depending on the furnace size, and these potentials are harmless if a shock is experienced.

13. The amperage per electrode in large furnaces is small, only 5400 and 7700 in a 3600-kw. furnace, whereas with other 3-phase and 3-electrode furnaces this would approach, at 80 per cent power factor at 110 volts, 23,600 amperes. This higher amount of current causes skin effect troubles, because these larger currents have to be brought to single electrodes.

14. The hearth bottom is burned in by the arc without the use of coke or other material.

15. The electric current can be kept on the furnace during tapping and charging, thus keeping the furnace at a more uniform temperature, with its consequent advantages of keeping the refractories from checking. The furnace thus does not cool down and a saving of 10 to 20 min. in time can be made on this account per heat, this being the usual charging time; whereas most other electric arc furnaces have the current shut off during the charging period because it is unavoidable.



# The Sales Engineer and Machine Design\*

How Studies of the User's Special Problems  
by the Maker's Engineer are Calculated to  
Hasten Progress in Machine Tool Evolution

BY A. J. BAKER

The user of a machine tool has of late learned to demand of the machine tool manufacturer a specific study of his (the user's) requirements, which studies have, and will more markedly in the future, influence the design of the manufacturer's product. The "service" plan, which covers many trades from tailors to tires, has become a part of machinery organization.

This condition has led to developing the sales engineer. His predecessor was the original demonstrator, who was and still is a man unusually skilled in the use of the machine which he demonstrates. He is sent out to break in the workmen and to assist the customer in obtaining high production from the newly installed tool.

These demonstrators in their visits to the different plants accumulated considerable experience in regard to the uses and weaknesses of their machines. They served as a highly valuable intermediary between customer and manufacturer, and following the natural onward tendency, they were in some cases replaced, or augmented by engineers, whose duties were not in any way connected with the demonstration or practical operation of the machine, but rather as to observations of the use to which the machine were put. These observing engineers carrying back to the factory their authentic data, were able materially to influence new designs. They were still, however, concerned only with the standard type of machine and were only brought into contact with the customer's requirements after the machine was installed, and usually when some trouble had developed.

The next step was in the utilization of these engineers in conjunction with salesmen, or agents, to investigate the customer's conditions before recommendations were made as to the installation of machines. You will note that his function was not to sell the machine; in fact, it was his duty to prevent the sale of machines where his knowledge made it evident that the customer's best interests would be so served. It became necessary, therefore, particularly as the mechanical responsibility of the whole transaction devolved upon him, to make a reasonably thorough analysis of the problem before proceeding with any recommendations. This analysis, in many cases, leads directly toward the design of new machines of pos-

sibly the same general classification, but of an entirely different type and I propose to mention here a few of the causes that bring this about in much greater measure than when the older method of machine design was followed.

The original machine designer usually devoted himself so closely to his own particular machine that he was not thoroughly in touch with developments taking place on other classes of machines. Even to-day, in the great majority of cases, that condition prevails. The sales engineer, on the contrary, being brought directly and frequently in touch with the last installations of such machines, immediately returns to the factory with advance information of the encroachments that the new type of machine is making on his own field.

The designing department, lacking a detailed acquaintance with the last usage to which machines are put, loses its proper perspective in regard to the relative time values of the different functions of the machine. The sales engineer, with any reasonably well-developed analytical faculty, can clearly see that a certain portion of the operation consumes more time than is really necessary, that the output is governed by this factor and advises the home engineer of the need for improvement in this respect. The home engineer includes in each new machine or each new design certain parts, which, while necessary, or at least desirable, under the old system of comparatively low production, are not only unnecessary, with the present high production ratio, but are absolutely undesirable on account of added complication. The sales engineer, being brought face to face, as he must often be, with the relative selling prices of machine tools, will naturally tend towards an elimination of those less desirable features with a consequent simplification of the machine.

It is idle to suppose for a moment that such improvements are found only in the larger shops, to which, as a rule, the visits of the home engineer are confined. It will often be found that the small shop with its restricted equipment will have produced

some interesting and instructive method of producing the desired results, where the larger and wealthier shop has been content to increase its quota of standard machines.

Carefully tabulated records of similar jobs performed in different shops will nearly always indicate parts which may be omitted and functions that should be added, which informa-

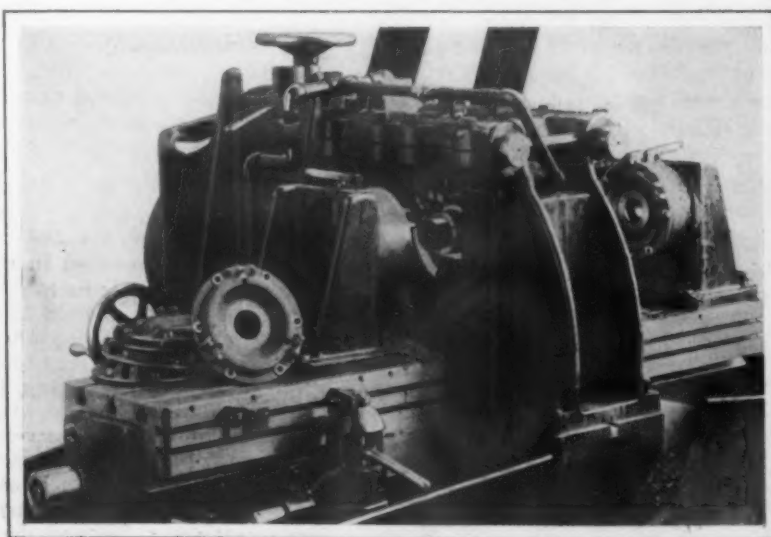


Fig. 1—Triple-Spindle Attachment Fitted with an Adaptation of the Semi-automatic Milling Machine

\*From a paper read before a joint meeting in Cincinnati, March 16, of the Cincinnati Section of the American Society of Mechanical Engineers and the Engineers' Club of Cincinnati. The author is identified with the Cincinnati Milling Machine Company.

tion cannot be obtained in any other way with either the same certainty or the same speed, and in these ways the influence of the sales engineer on the design of his company's product cannot fail to be very marked.

His influence on production, while closely connected with design and thus of interest to the manufacturer, will be of more vital and material interest to the customer. The general adoption of this sales engineering system immediately places at the disposal of the machine user, a corps of highly trained engineers whose collective abilities are likely to exceed greatly those over which he would normally have control.

#### HOW THE SALES ENGINEER WORKS

It must be apparent that the recommendations of the sales engineer cannot be made on the spur of the moment, but must receive a reasonably thorough preliminary study and investigation. In the company with which the writer is connected, it has been the practice for the last half dozen years to make comparatively elaborate time studies, for which considerable advance information is needed. This information must not only cover the end which it is desired to accomplish, but should also include a reasonable amount of data as to the earlier and existing methods. This is particularly essential because it has developed that the sales engineer, seeking continual outlet for his machines, will often invade the field that has been considered the exclusive property of some other type of machine. It is sufficiently obvious that there must be much debatable ground to be fought over by the competitive representatives of the engine lathe, the turret lathe and the automatic machine, and again among the planer, shaper and miller advocates.

The ideal conclusions drawn from such investigations can only follow a very full consideration of all of the factors connected with production and not only, as is sometimes the case, with the number of pieces turned out per machine per day. For these reasons certain standard forms are used on which is entered the following information, derived from the user of the machine:

1. The quantity per annum.  
And, if possible, the size of the lots in which the work is put through the factory.
2. The degree of finish required.
3. The quality of material.
4. The depth of cut.
5. The machine on which the work is now being done.
6. The time consumed.
7. The wage rate paid.
8. The burden or overhead charge (particularly if departmental burden is available).
9. And the objections, if any, other than as to the time consumed, that may be made to the existing method. This latter may deal with the labor supply, the dependence upon certain materials, or certain limited conditions.

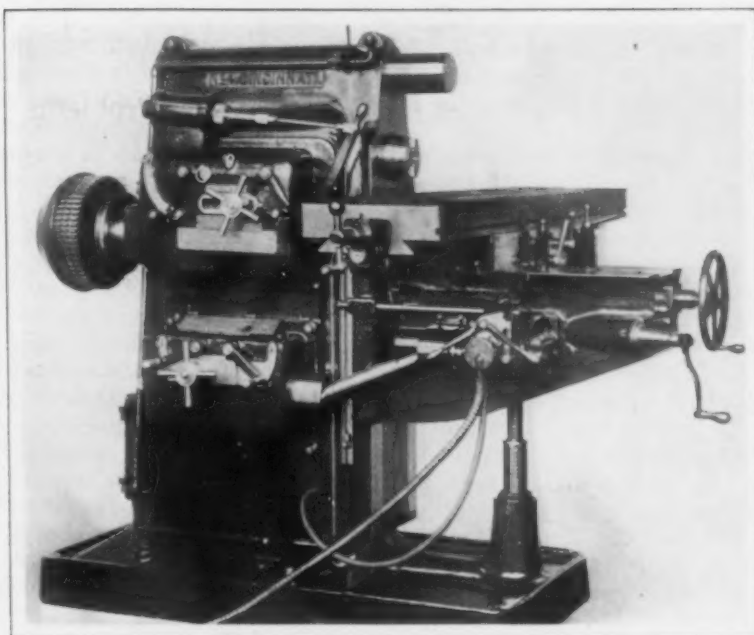


Fig. 2—Attachment to Prevent Marking of Work by Quickly Stopping Rotation of Milling Cutter

This report is supplemented either by a sketch of the piece, or preferably by the customer's blue prints. Samples for preliminary cutting tests are also obtained whenever possible. With all of this information, a time study can now be made up, which will give in full detail the separate operations, the time taken for each part of the operation, the speed and feed necessary and a sketch and description of the fixture and

cutters to be used. The resulting total time, which will then represent the time required for the production of the individual piece, receives the addition of a certain percentage, which will, of course, vary with the nature of the shop and is a figure that can be easily established as a standard.

This information is then submitted to the customer and in certain cases accompanied by a cost sheet, comparing the suggested and existing methods. This sheet will specify the time per piece, including the above percentage, the total time per annum for the quantity of pieces required, the wage cost, the burden or overhead cost, showing annual saving over the old established system, which saving can, of course, be balanced against the increased cost of equipment as contemplated by the customer.

Such cost comparison and estimate sheets are in themselves not necessarily final, but their great virtue is that they form a nucleus for specific analysis and recommendations on the part of the customer and his engineers. It is particularly important that such detailed information should be submitted, because the production from a given machine is very often entirely independent of the ability of that machine to carry through a certain cut; it is often entirely dependent upon the chucking time afforded the operator and still again, frequently dependent upon the spacing of the feed marks, or quality of finish. This latter may very well be a commercial necessity and entirely independent of the degree of accuracy.

The user will more often clear his mind of all the details of the machine and reach the pertinent points that are connected with production. He is more apt to compare the machine the sales engineer may be interested in with some other entirely different machine, which incorporates some feature of marked importance to his particular class of work. It would seem, for instance, that the day of the automatic power return of the tables of small milling machines would have come much sooner had its users compared the miller with the planer in the way that should have been done. It would really not have been necessary to compare the miller with the planer but with some of the larger planer-type milling machines, on which such apparatus is standard equipment. It would further seem that the



flooded lubrication of milling cutters should have come sooner had the proper comparisons been made between a milling machine and a grinder. Parallel cases could doubtless be found throughout the full machine tool field.

The change in the make-up of the machinery salesmen or agencies has been very marked and their ability to render practical service to the consumer is much greater than ever before. Some agencies are controlled by men of marked mechanical attainments. Their influence on production is very great indeed and it is probable that the full record of the influences of the separated selling houses on machine-tool design would make highly interesting and instructive reading.

The accompanying illustrations show the particular influence that has been exercised on one type of machine tools, namely, milling machines, by such work as I have above endeavored to describe. Fig. 1 shows a triple-spindle milling attachment fitted with an adaptation of the semi-automatic milling machine. Before this equipment was considered the work was handled in the stereotyped way, which consisted of one chucking, milling one set of bosses, indexing through 120 deg., milling the next set, indexing, milling the third set and removing. With this equipment, the three spindles mill all of the surfaces at one passage and the work itself is automatically clamped in place by means of the spring plunger shown in the center of the fixture. The table is provided with an automatic quick forward movement, feeding movement, quick return to the fixture on the other side, feeding movement, and so on. The functions of the operator in this case are restricted to that of hooking the work on to the central locating stud and removing it. The operations are timed to allow the removal of one piece and the insertion of the other while the cut and the quick traverse from the work take place.

In connection with the milling of turbines, Fig. 2 is shown. It illustrates an attachment to machines which will in all probability ultimately become standard either along the lines adopted in this instance, or through some other mechanical appliance. It is commonly found in practice that cessation of the feed movement when combined with a continued rotation of cutter nearly always results in an indentation or marking of the work. Normally, this is not of great importance because the majority of cuts are such that the cutter can be run completely over the work and the feed cessation can take place when there is no engagement between these two parts. In the particular instance for which this machine was required, this was impossible, and as the section of the work had to be uniform the indentation was a serious matter.

The machine was equipped with a pneumatic cyl-

inder connected with the starting handle. The cylinder is operated through the usual compressed air system in the factory and controlled through a pair of valves on the feed trip rod. As soon as the feed plunger is depressed by the trip dog, the feed movement is stopped and the spindle is stopped also, not simultaneously, but as soon as the momentum of its moving parts can be overcome. The momentum in this particular case was sufficient to just disengage those teeth which were cutting at the moment of the feed cessation and so avoid leaving any ridges where the teeth were in contact with the work. The machine is then available for the operator to return the table, either by hand or through the power quick return and after the new piece has been chucked in place of the one already machined, a movement of the feed lever throws the spindle clutch back and starts up both speed and feed simultaneously.

The third example shown, Fig. 3, is interesting in that the conditions that had to be overcome before this equipment could be installed were such

as to make it hardly possible to effect a saving. The pieces that are milled with this apparatus are small tractor binder pins, in the full length of which a half-round groove is to be found. These pins have a slight taper on the outside. The old method for handling this work was to use a standard milling machine operated by a man engaging the feed, returning the table and re-

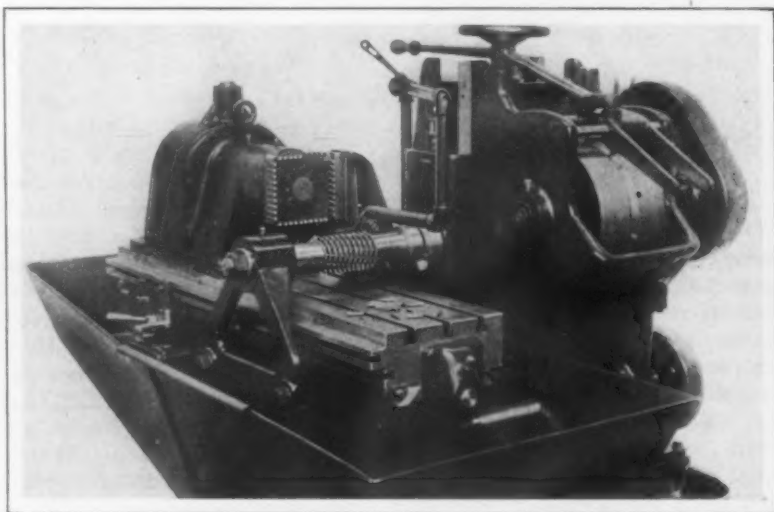


Fig. 3.—Machine Made Substantially Automatic and Given Increased Output by a Simple Attachment

moving the work from the fixture. He was aided by a boy, who drove the pieces into the work holder, of which two were provided. The work holder itself consisted of a flat strip having taper holes into which the pins were forced, the strip itself being handled as a unit after it was filled up by the boy.

The machine was under such conditions cutting for quite a large proportion of its time and the boy was loading the pieces into the work holder as rapidly as they are loaded to-day, but with the method shown we were able to beat very materially the production per machine and to do it with one operator only. The fixture is arranged so that it automatically indexes, and the forward movement of the work to the cutter is taken at a high table traverse. The work does not have to be driven firmly into the grooves, since the action of the cutter itself tends to force it home to a bearing. It does not have to be removed from the fixture after the milling operation is completed because the third step in the indexing brings the finished pieces against a fixed ejector bracket which pushes them out of the holes.

The operator loads into the upper horizontal surface and he can also load in the front vertical surface should he fall a little short in his chucking of the full number held in the one side. It will be seen that with the exception of the twentieth part of a minute taken for indexing from one sur-



face to another, a similar twentieth taken in returning, we have cutters which operate all the time.

There is thus no dwell and the operator's cycle is of the very simplest character possible. His functions are again confined only to putting the work loosely into the holder. He does not have to move it after cutting, and the only thing left that could be improved on in this connection would be the provision of a hopper feed, so that a bucket full of the pins could be thrown in indiscriminately and the machine then become entirely automatic. This is the next step which will doubtless follow.

The illustrations show that an attempt has been

made to depart from standard practice where the need for such action is indicated by a study of the conditions. The resulting equipment, while not ideal from a designer's standpoint in that it is obviously necessary to start with a foundation laid down for more general purposes, does, nevertheless, perform satisfactorily and so justifies itself from the viewpoint of dollars and cents. More important than this, however, is the clearer light thrown upon the problem, the positive indication of the direction of future design and the certainty that the combined knowledge of all concerned has been so utilized as to make it valuable for future research in meeting the user's special problems.

## The Steel Industry of Great Britain

How Domestic and Imported Ores Have Fixed  
the Lines of Development—Basic Open-Hearth  
Gaining, But Basic Bessemer Relatively Small

BY H. H. CAMPBELL

Half a century ago there were many places in Great Britain where pig iron was made from native ores for foundry use and for puddling furnaces, and where wrought iron was produced in large quantities; but between 1860 and 1870 the acid Bessemer process was developed and it was soon found that in all Great Britain there was only one place where ores could be mined that would produce pig iron suitable for the acid converter. This was on the West Coast in the neighborhood of Barrow-in-Furness, between Liverpool and Glasgow.

### THE WEST COAST

These beds had been worked for a hundred years, but they were not regarded as of exceptional importance, for although it may have been known that they were low in phosphorus, yet in the old days of wrought iron this element was not a bugbear. As soon, however, as it was found that these ores would make Bessemer pig iron they at once became valuable, and the mineral was shipped to steel plants in other parts of the country, large amounts going to southern Wales. The ore varies at different mines, but the average for the district is about 53 per cent of iron, while the phosphorus is so low that the pig iron holds only 0.04 per cent.

Furnaces were quickly built near Barrow-in-Furness and pig iron was sent away in considerable quantities, large exportations being made to the United States. Steel plants were also started and for the last 40 years this district has been an important center for the production of acid Bessemer steel. Thirty years ago enough ore was mined every year in Cumberland and Lancashire to make 1,500,000 tons of pig iron, or 20 per cent of the total output of Great Britain at that time. Since then production has decreased owing to the exhaustion of the mines, so that the ore raised to-day is equivalent to less than 1,000,000 tons of pig iron; and as the output of the country as a whole has increased, the ores of the West Coast now represent only 10 per cent of the pig iron smelted in Great Britain. They make a larger proportion of the tonnage of steel, because practically every pound of pig iron made from the West Coast hematites is used for acid steel.

### IMPORTED ORES

Before the introduction of the Bessemer process practically no iron ore was imported by Great Britain, and as late as 1870 the receipts were only 400,000 tons; but importations rapidly increased, so that between 1880 and 1885 they averaged about 3,000,000 tons per year, almost all of this coming from Spain. There has been a steady increase in imports ever since, and in 1913 they amounted to 7,442,000 tons, the principal contributing countries being the following: Spain, 4,714,000 tons; Algeria, 763,000 tons; Norway, 490,000 tons; Sweden, 367,000 tons; France, 327,000 tons; Tunis, 279,000 tons; Greece, 217,000 tons; Newfoundland, 100,000 tons; Russia, 79,000 tons; while other countries sent 106,000 tons.

It is by the use of these imported ores that Great Britain has maintained a prominent place as a steel producer, and this dependence on the outside world becomes more and more pronounced from year to year. Thirty years ago only 20 per cent of the pig iron made in Great Britain came from foreign ore; but in 1913 the importations accounted for 40 per cent of the output of pig iron and probably a little more than one-half of the steel.

This foreign ore goes to all parts of the kingdom, and in 1913 cargoes were unloaded at more than 50 different ports, but nine-tenths of it was divided between three distinct steel producing districts; the immediate vicinity of Middlesbrough on Tees, the district around Glasgow, and the northern shore of the Bristol Channel in the neighborhood of Cardiff.

### THE MIDDLESBROUGH DISTRICT

This is by far the most important iron-producing district in Great Britain, and in 1913 it made 38 per cent of all the pig iron of the country and nearly 6 per cent of the total of the world. Within 25 miles are the coal fields of Durham, which furnish as good coke as comes from Connellsville, while the Cleveland ore beds are still nearer. This Cleveland ore is a carbonate, containing in its natural state from 26 to 29 per cent of iron, but it carries over 30 per cent of volatile matter in the form of carbonic acid and both free and com-

bined water, so that it is always roasted before it is put into the blast furnace. The calcined ore has the following composition: Metallic iron, 36 to 40 per cent; silica, 14 to 20 per cent; alumina, 13 per cent; lime, 7 to 8 per cent; magnesia, 5 per cent; phosphorus, 0.62 to 0.68 per cent.

#### Costs

The cost of Cleveland ore is constantly increasing. In 1899 the value at the mines was \$1.01 per ton, which would be about 3.67c. per unit; it was 3.82c. in 1911; it went up to 4c. in 1912, and to 4.50c. in 1913. The freight and the expense of roasting must be added, so that the cost of this ore at local furnaces just before the war was about 6c. per unit.

The increase in the cost of the ore has been reflected in the selling price of pig iron. In 1900 Cleveland pig iron was quoted at \$11.20 per ton, while in 1914 just before the war it was \$12.20 per ton. This pig iron is excellent for foundry use and is exported in large quantities to Germany, France, Belgium, Russia and all parts of the world. For the four years from 1910 to 1915 inclusive the exports of pig iron from Great Britain averaged 1,204,000 tons per year, or 12 per cent of the total output, and a large proportion of this was Cleveland iron.

The output of Cleveland ore in 1913 was 6,011,000 tons, which represented about 2,000,000 tons of pig iron or 20 per cent of the total for Great Britain. The rate of production has been practically stationary for over 30 years, this condition of affairs being due to the domination of the labor unions, as explained in the following quotation from a paper read a few years ago before the British Iron and Steel Institute:

#### Labor

"A serious difficulty in obtaining Cleveland stone is the action of the miners who, when trade is good and wages high, elect to work short time and maintain the same weekly wage as when working full time at the lower wage in worse times; the output per man per week being thus curtailed. If more men are put on they are necessarily new at the work and at first do not mine so much ore; hence the average for the district falls and the labor union officials immediately demand an increase in the rate for mining stone."

As this superintendent remarked, the owners were between the devil and the deep sea. At that very moment Parliament was discussing the subject of unemployment, while more and more foreign ore was being brought to the northeast coast every year to supply the needs of the blast furnaces.

#### BASIC STEEL ON THE NORTHEAST COAST

Some basic Bessemer steel is made at Middlesbrough, but if Cleveland ore is used exclusively the iron contains only about 1.60 per cent of phosphorus and so it is necessary to use some puddle cinder, or ore high in phosphorus, as the basic converted demands about 2 per cent of this element. It is also necessary to use manganiferous ores to supply the requisite amount of manganese and as such ore must be imported in the almost total absence of any supply in Great Britain, these additions increase very appreciably the cost of the pig iron. For these reasons the basic Bessemer process has never made much headway in the place of its birth.

#### ACID STEEL ON THE NORTHEAST COAST

An increasing tonnage comes from the basic open-hearth furnace, but acid steel from foreign

ore constitutes the real foundation of the steel industry of Middlesbrough. In 1913 the total ore imports for the United Kingdom amounted to 7,442,000 tons and the ports at the mouth of the Tees claimed 3,438,000 tons, or 46 per cent of the total, this being equivalent to about 1,930,000 tons of pig iron. As the total production of pig iron in this district in that year was 3,869,000 tons, it will be seen that just about one-half came from foreign ore.

There is a slight but appreciable deterioration from year to year in the quality of the ore imported into Great Britain, while the price is increasing, so that the cost of pig iron is rising. In 1900 the market price of Bessemer pig iron was \$13.85, while just before the outbreak of this war in 1914 it was \$14.60 per ton.

The proportion of steel made from imported ore cannot be stated, for no accurate statistics are collected at present, although a movement is under way to have this done. Again it is not possible to tell just how much steel a ton of iron will make. If it goes into a Bessemer converter it may make just 1 ton, but if it is used in an open-hearth furnace it may represent 3 tons or more. But we know that a large proportion of the iron made from the local Cleveland ore goes into miscellaneous castings, some into wrought iron and that some is exported, while practically all the imported ore eventually appears as steel; and we may say that two-thirds of the steel made at Middlesbrough has its origin in foreign ore.

#### GLASGOW

The southwest of Scotland has always been noted for the excellence of the foundry pig iron made from the local blackband. This is an ironstone which comes from the coal mines and it may be regarded as a by-product which costs nothing; so the production of this ore and of the pig iron made from it continues from year to year, although the output is steadily decreasing. The steel of the district is made from foreign ore and the amount imported is increasing every year. In 1913 a total of 1,660,000 tons was brought into Glasgow, corresponding to 930,000 tons of pig iron or 9 per cent of the total output of Great Britain. All of this was made into steel in open-hearth furnaces, the acid process being used almost exclusively, and the product went mostly to the shipyards on the Clyde.

#### THE BRISTOL CHANNEL

In 1913 the imports of ore to points near Cardiff reached 1,500,000 tons, representing 860,000 tons of pig iron, which accounts for all of the 889,000 tons of pig iron produced here, this being 9 per cent of the output of Great Britain. The neighboring Forest of Dean is famous in the history of the iron trade and it produced large quantities of ore as late as 1870, and even after that; but the output to-day is negligible. Unlike the iron districts of Middlesbrough and Glasgow, the Bristol Channel is not increasing either its imports of ore or its output of iron and steel, and so is falling behind in relative importance.

#### STAFFORDSHIRE AND SOUTH YORKSHIRE

The county of Staffordshire, like Scotland, produces a considerable quantity of blackband from its coal mines, but the total output is only half what it was 30 years ago. The local blast furnaces have maintained their production by smelting foreign ores, while recently there has been a considerable increase in production through the use of the lean ores of Northamptonshire only 60 miles away. In



1913 the output of pig iron was 783,000 tons, or nearly 8 per cent of the total for Great Britain.

No review of the steel industry would be complete without a word about Sheffield in South Yorkshire. This district in 1913 made only 303,000 tons of pig iron, or 3 per cent of the total for the kingdom; but its proportion of steel was much greater. It is at a disadvantage on account of its inland position, but it is within 50 miles of the ore fields of Lincolnshire and has cheap and abundant supplies of coal.

#### EASTERN CENTRAL ENGLAND

In Lincolnshire, Leicestershire and Northamptonshire are large beds of iron ore which are worked as open quarries, there being only a few feet of overburden. This is the only place in Great Britain where the output of native ore is increasing. Thirty years ago the production in these three counties was about 1,275,000 tons per year, while in 1913 it was 2,915,000 tons, representing 900,000 tons of pig iron or 9 per cent of the total for Great Britain.

It is difficult to give any average of the ores in Lincolnshire, because every quarry is different and there are varying strata and pockets in each quarry; but we may generalize and give the following as the composition of these ores: Iron, 20 to 30 per cent with an average of 26 per cent; silica, 5 to 15 per cent with an average of 10 per cent; lime, 2 to 30 per cent with an average of 14 per cent. The volatile matter, including moisture, combined water and carbonic acid, varies from 20 to 40 per cent with an average of 30 per cent. It is usually possible to get a self-fluxing mixture, while the pig iron will run about 1.20 per cent in phosphorous. The average cost of Lincolnshire ore at the mines is about 60c. per ton, or 2.3c. per unit.

In Lincolnshire the ore, although low in iron, is desirable because it is high in lime, but in Northamptonshire we have silica to contend with and of course no line can be drawn between silicious iron ore and worthless sand containing iron. What is rated as good ore in Northamptonshire will vary from 30 to 50 per cent in iron and from 5 to 15 per cent in silica; but the British Official Report for 1911 gives 32.4 per cent of iron as the average of all the ore mined in that year, while the value was 48c. per ton or 1.5c. per unit. The volatile matter runs about 25 per cent, including moisture. There is only a small proportion of lime, while phosphorus is present in quantity sufficient to give about 1.50 per cent in the pig iron.

#### OUTPUT OF STEEL

Table A compares the production of steel in 1903 with that of 1913 and shows that during these ten years the output from the acid Bessemer decreased, while that of the basic Bessemer did not increase. The production from acid open-hearth furnaces grew larger and half the steel is now made in this way; but the most notable change is the development of the basic open-hearth furnace, which in 1913 made nearly 30 per cent of all the steel.

Table A—Output of Steel in Great Britain

	Thousand Tons		Per Cent of Total	
	1903	1913	1903	1913
Acid Bessemer	1,317	1,049	26	14
Acid open-hearth	2,613	3,811	52	50
Basic Bessemer	593	552	12	7
Basic open-hearth	511	2,252	10	29
Total	5,034	7,664	100	100

#### SUMMARY

The district around Middlesbrough on the

Northeast Coast is the most important iron center in Great Britain, mining nearly 40 per cent of all the ore raised in the kingdom, producing nearly 40 per cent of the pig iron, receiving nearly half the foreign ore and making about one-third of the steel. Glasgow, the West Coast and Cardiff follow, these three districts together making one-third of the total pig iron and a slightly greater proportion of the steel. The four districts combined receive nine-tenths of the foreign ore and make from two-thirds to three-quarters of all the pig iron and steel produced in Great Britain.

In 1913, which was the last normal year, almost exactly 16,000,000 tons of ore was raised in Great Britain; and of this total 14,200,000 tons contained only 30 per cent of iron or less. This lean ore accounts for half the pig iron made in Great Britain; but it does not account for half the steel, because acid steel formed 64 per cent of the total and three-quarters of this, or half the total production, had its origin in imported ores. So to-day Great Britain is dependent to a great extent on foreign raw material; but the increasing use of the basic open-hearth furnace may make the country more self-sustaining and make vast stores of ore, which are low in iron and high in phosphorus, available for the making of steel.

### Ann Arbor Conference on Scientific Management

An open conference on scientific management is to be held at the University of Michigan, Ann Arbor, Mich., on May 11, 12 and 13, by the Taylor Society, the new name of the Society to Promote the Science of Management. A feature of the meeting will be a number of simultaneous round table discussions applied to various types of industries arranged for Friday morning, May 12. One of these has to do with machine shops, another with automobiles and another with traveling sales management. The leaders for these discussions are as follows:

Machine Shops—Carl G. Barth, consulting engineer, Philadelphia; Commander Allen M. Cook, Norfolk, Va.; H. K. Hathaway, Tabor Mfg. Company, Philadelphia; F. A. Parkhurst, Detroit; Albert R. Shipley, Seth Thomas Clock Company, Thomaston, Conn.

Automobiles—F. F. Beall, vice-president in charge of manufacturing, Packard Motor Car Company, Detroit; J. C. Regan, Timken-Detroit Axle Company, Detroit.

Traveling Sales Management—H. A. Brown, Tabor Mfg. Company, Philadelphia; John M. Bruce, New York City; Henry T. Noyes, German-American Button Company, Rochester, N. Y.; R. Mayo-Smith, Plimpton Press, Norwood, Mass.

On Friday afternoon an illustrated address entitled "Scientific Management in the Operation of a Public Service Corporation" will be given by Charles Day, Day & Zimmermann, Philadelphia. On Friday evening an address entitled "An Illustrated Trip Through Scientifically Managed Factories" will be delivered by H. K. Hathaway, vice-president Tabor Mfg. Company, Philadelphia.

Introductory addresses opening the conference are scheduled for Thursday afternoon and evening, and the round table discussions will be opened by a paper, "Scientific Methods of Management Applied to Various Types of Industry," by Sanford E. Thompson, consulting engineer, Boston.

Dr. Harlow S. Person, Tuck School of Administration and Finance, Dartmouth College, is president of the Taylor Society, and Henry W. Shelton, 35 College Street, Hanover, N. H., is secretary.

The Merchants Steel & Supply Company, W. K. Kenly president, dealer in iron and steel scrap, has removed from the Marquette Building to 1810 Continental & Commercial Bank Building, Chicago.



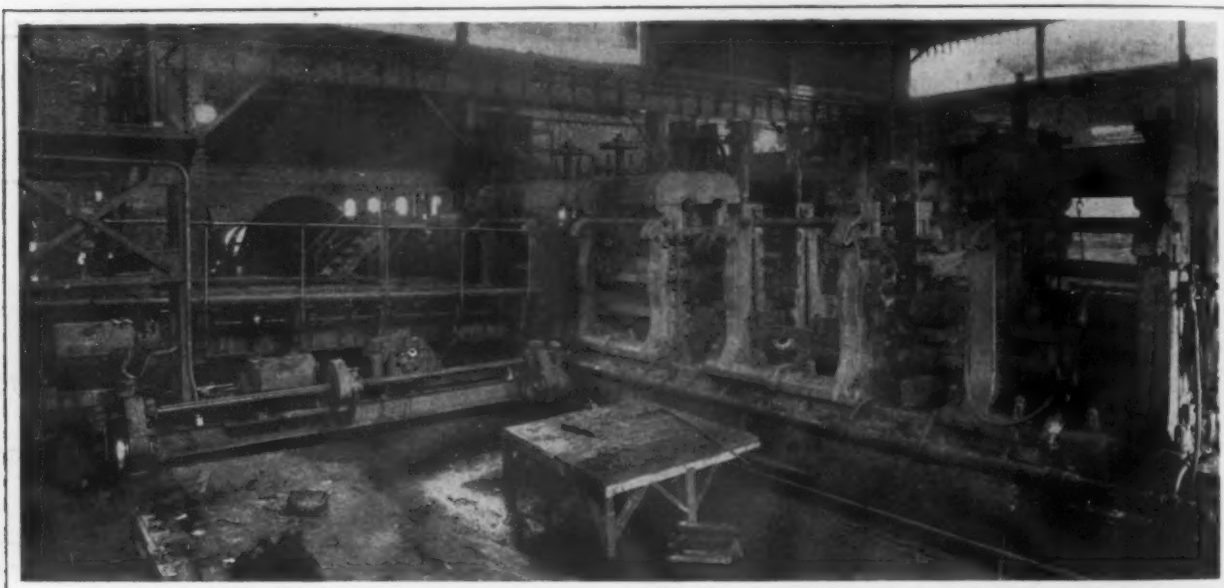
# New Bar Mill of Notable Flexibility

Electric Drive and New Type of Speed  
Control at Union Rolling Mill Company's  
Plant Permit Wide Range of Rolling

The Union Rolling Mill Company, Cleveland, Ohio, has recently placed in operation its new 21-in. merchant bar mill, which is notable because of its unusual flexibility. The wide range of sizes and shapes that it can roll is made possible to a large extent by the variable speed electrical drive and a new system of speed control, being the first of this type to be adopted in this country. It has a capacity for rolling rounds from 1 $\frac{3}{4}$  to 7 in. in diameter, squares up to 4 in., angles up to 6 x 6 in. and I-beams up to 12 in. It is expected that it will reach an output of 10,000 tons per month running double turn.

long and the rolls of the other three stands are 60 in. long between housings.

For handling the steel from one stand to another in the process of rolling, there are four traveling tilting tables 24 ft. long. Back of the tilting tables on each side are back tables, each back table consisting of two roller tables and a transfer. These tables are approximately 15 ft. wide and 50 ft. long, extending back from the mill about 75 ft. The roller tables are controlled from the tilting tables. The control for the transfer is from a control platform at the side of the building near the mill. Each tilting table is driven by three 30-hp. motors.



Back View of the Mill Showing One of the Traveling Tilting Tables at the Left

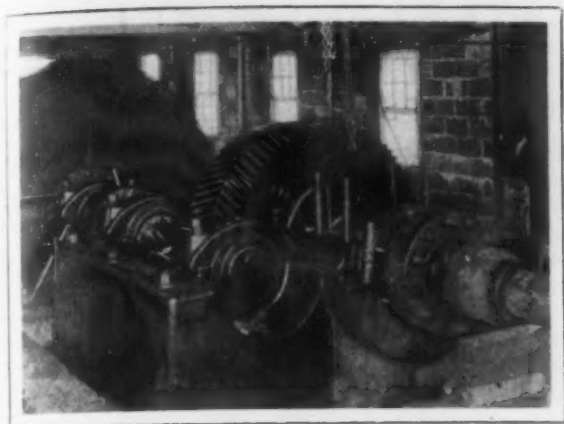
The installation of this 21-in. mill is another step in the transformation of a rolling mill plant into a steel-making plant brought about by the increased use of steel as compared with bar iron. The plant was established in 1880 as a rolling mill and for many years only bar iron was produced. In the past three or four years its steel production has been increased materially so that now fully 75 per cent of its output is steel and only 25 per cent is iron bars. In addition to the new 21-in. jobbing mill the company has 8-in., 9-in. and 18-in. mills and a puddling mill and its rolling capacity before starting the new mill ranged in bar sizes from  $\frac{1}{4}$  in. to 4 in.

The new mill, which is a standard jobbing mill, consists of four stands of rolls, three 3-high stands and a fourth, a finishing or bull head stand. The first two stands are roughing rolls and the third is a strand stand, through which the material is given the leading passes, taking its first form through octagon rolls, being given two passes through these rolls, under and over. The use of the octagon rolls obviates the necessity of an adjustable guide box, side guards being used in its place. The number of passes through the roughing rolls depends on the section being rolled. The standard rolls are 21 $\frac{1}{2}$  in. in diameter. The finishing mill rolls are 48 in.

Each roller table and each transfer is driven by a 20-hp. motor.

The electric drive for the mill possesses certain features of especial interest to the steel-mill engineer. Due to the wide range of merchant and structural shapes proposed, means of accurately controlling the speed of the rolls was absolutely necessary. Furthermore, it was essential that the automatic variation in speed from no load to full load be limited to a predetermined value which would most efficiently permit the flywheel to give up a portion of its stored energy during periods of peak loads, thus equalizing the demand from the power company's lines. Another important factor in determining the final design was the requirement of increased torque as the speed of the mill is reduced.

The system of speed control finally adopted was that recommended for the first time in this country in the fall of 1912 by the General Electric Company for the speed control of the 6500-hp. motor on the 60-in. universal plate mill at Gary, Ind. For industrial rather than engineering reasons, the proposed auxiliary speed controlling equipment was never purchased for the Gary motor and in the period from 1912 to the present, a different system has been developed.



Gear with Cover Removed and Flywheel

The system adopted for the Union 21-in. mill has been variously referred to as the Kraëmer, or rotary converter system of dynamic speed control for induction motors. The equipment consists briefly of a simple three-phase induction motor of the slip ring rotor type of the characteristically rugged design for steel-mill service. This motor is rated 1400 hp. at 600 r.p.m. (synchronous) or 950 hp. at 450 r.p.m. with 35 deg. C. temperature rise. It is also capable of carrying a guaranteed overload of 25 per cent continuously with a temperature rise not exceeding 50 deg. C. or 50 per cent overload for one hour with rise not exceeding 60 deg. C. The synchronous speed of 600 r.p.m. is exceptionally high for steel-mill drives of this capacity, and its adoption strongly indicates the increasing confidence of mill and gear manufacturer in the reliability of high-speed heavy-duty gears, as well as the tendency toward reduction of first cost of electrical equipment by the use of high-speed geared units. Direct connected to the main induction motor shaft is a separately-excited compound-wound interpole motor rated at 450 hp. at 405 r.p.m. The third of the main units comprising this drive is an ordinary rotary converter, but slightly modified from the standard 25-cycle design and is rated 325 kw. at 750 r.p.m. A small exciter set, motor-driven, fur-

nishes excitation for both the D.C. 450-hp. motor and the rotary converter.

Speed control within the ranges indicated is obtained by manipulation of the 450-hp.-motor field. Strengthening this field reduces the speed of the induction motor and weakening the field increases the speed of the induction motor. The series winding on the D.C. motor gives automatically the desired flywheel slip.

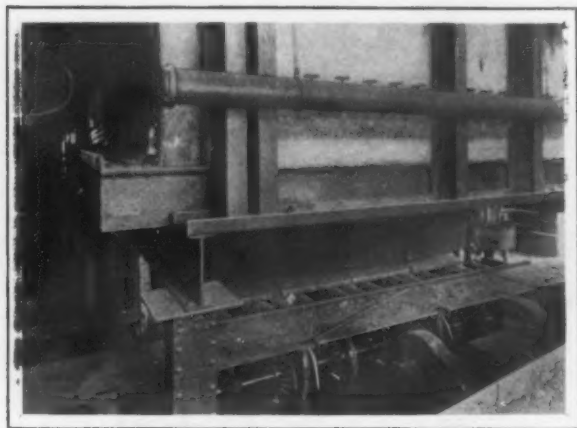
Briefly the equipment functions as follows: Three-phase 60-cycle energy at 2200 volts is supplied the primary windings of main induction motor. A portion of this is transformed into useful mechanical work at the shaft; a second portion undergoes a purely electrical transformation to three-phase energy in the secondary or rotor circuits of a voltage and frequency dependent upon the speed of the rotor. As its speed is reduced, the secondary or slip ring voltage increases from zero values at synchronism to a definite maximum voltage and line frequency at standstill. The amount of slip energy is, of course, a function only of the mechanical load on the motor and is independent of the speed.

This slip energy at varying voltage and frequency is fed to the slip rings of the rotary which, in turn, delivers direct current at proportional voltage to the D.C. motor, where it is transformed to useful mechanical work. The torque of the D.C. motor is, therefore, added to the torque of the main induction motor, with the result that at minimum speed of 405 r.p.m., the D.C. motor develops a rated load of 450 hp. and the induction motor 950 hp., making a total rated output of 1400 hp. for the set at all speeds.

The drive from the main motor is through a Francke coupling to the flywheel and gear set. Helical cut gearing is used. The gear has a 33-in. face, 6-ft. 6-in. pitch diameter and 6-ft. 7.6-in. outside diameter, with 78 teeth. The pinion is a steel forging with 33-in. face, 15-in. pitch diameter and 15 teeth, making a ratio of the pinion and gear  $5 \frac{1}{5}$  to 1. The flywheel is 10 ft. 9 in. in diameter and has a 16-in. face and is built up of 1-in. plates riveted together and bolted to the cast steel hub. The peripheral speed of the flywheel is 17,000 ft.



Induction Mill Motor with Direct-connected Direct-current Motor, with Flywheel at the Left and Accelerating Resistance on the Right



Discharge End of the Heating Furnace

per minute. The gear and shaft weigh 34,000 lb. and the flywheel not including shaft 55,000 lb. The pinion bearings in the gear set are roller bearings and the gear bearings are babbit bearings. The drive provides a variable mill speed of 80 to 110 r.p.m. In rolling small rounds, 3-in. and under, on which the mill is now running, a speed of 80 to 85 r.p.m. is maintained.

The heating furnace is a standard continuous-end discharge, natural gas fired of the recuperative type, with a heating chamber 45 ft. long and 12 ft. wide. The billets are carried on water-cooled skids in the usual manner and on being re-heated are discharged by gravity to the roughing mill approach table. The furnace was furnished by the S. R. Smythe Company. A second furnace, a duplicate of the one in operation, is now being installed. The approach table to the roughing mill is 30 ft. long and is driven by a 30-hp. motor. This table will be extended to reach along the discharge end of the second furnace.

Billets are unloaded from the cars in the billet yard with a 10-ton 3-motor transfer traveling crane of 60-ft. span. This is equipped with a 10-ton monorail trolley with an independent hoisting motor, the monorail track connecting the transfer bridge of the crane with the billet charging platform back of the heating furnace. In conveying the billets from

the billet yard to the furnace the trolley is run along its monorail track to the crane transfer. The crane covers any part of the billet yard and is controlled from the operator's cage on the monorail trolley. The monorail trolley is equipped with two magnets hooked in multiple for handling billets. The billet yard crane and monorail trolley were furnished by the Cleveland Crane & Engineering Company. The furnace charging pusher is of the standard type of the full width of the furnace chamber.

The finished bars are delivered by the back table to the saw approach table 50 ft. long and they are sawed on a 42-in. sliding-frame hot saw. The feed control on the hot saw is an interesting feature, being operated by two shunt motors operating through differential gears. The difference in the two motor speeds is obtained by field control that determines the travel of the saw, so that with the two motors running at the same speed the saw does not travel, the direction of the travel being controlled by one motor's running faster than the other. Adjoining the saw at the front end of the saw delivery table is a crop end pit. The crop ends are chuted down into a bucket in this pit for handling by the overhead crane.

At the side of the saw delivery table is a straight edge which pushes the finished steel out on the hot bed a distance of about 10 ft. From that point the bars are pulled over to the opposite side of the hot bed and to the hot bed delivery table by means of dogs. The hot bed is a standard flat rail bed 60 ft. long and 55 ft. wide. Beams and channels may be turned up on edge when structural sections are being rolled. The straight edge for pushing the bars on to the hot bed and the dogs that pull them on are provided with limit switches, preventing them from passing beyond fixed points on the hot bed. A roller straightener is provided for straightening beams, angles and some flats, driven by a 100-hp. motor, and a vertical shear, with a capacity of 3½ in. and driven by a 30-hp. motor, delivers to a weighing cradle from which it is loaded into cars with a 10-ton 80-ft. span Cleveland crane. A 42-in. cold saw is to be added.

The hot saw and its approach delivery table are controlled from one control platform at the side of



Transfer Connecting the Straightener Delivery and the Shear Approach Table, and, Just Outside the Building, the Shear, and Weighing Cradle



the building near the saw. The back table of the mill can be controlled from the same platform. When this back table is so operated it cannot be commanded from the operating platform on the tilting table. The mill, gear tables, hot bed, saw and shears were built by the United Engineering & Foundry Company. The motors for operating tables, shears, etc., are Westinghouse manufacture with magnetic control of the Electric Controller & Mfg. Company.

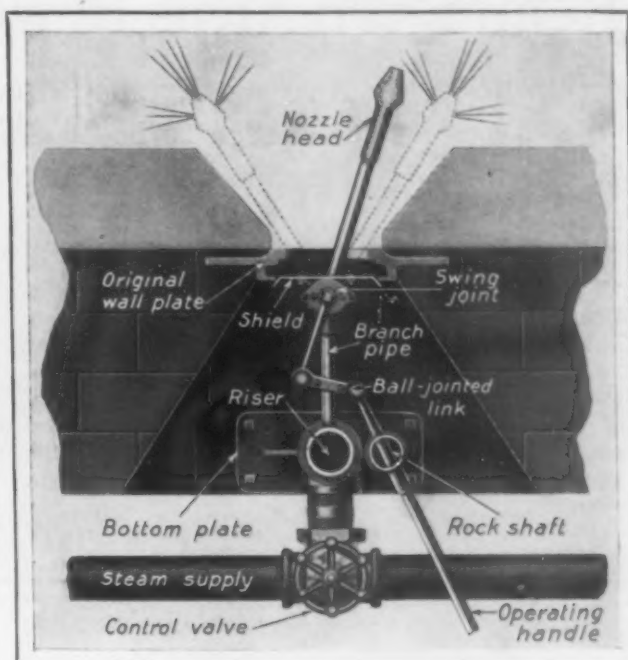
The mill structure is a standard type of mill building 425 ft. long and 75 ft. wide. It is covered with 22-gage corrugated sheets and has wood instead of steel roofing. The building is spanned with a 40-ton Toledo crane with a 10-ton auxiliary and another crane, of 10 tons' capacity, is to be installed. The building was erected by the Forest City Steel & Iron Company, Cleveland. In a lean-to on one side is housed the roll lathe department served by a 5-ton Toledo crane. The main mill drive is housed in a lean-to on the opposite side of the building.

### Soot Blower for Water-Tube Boilers

For removing soot and fine ashes from the heating surfaces of horizontal water-tube boilers having vertical baffles, the Bayer Steam Soot Blower Company, St. Louis, Mo., has developed a special type of apparatus. It is based essentially upon the projection of powerful oscillating steam jets into, through and laterally across the spaces between the horizontal rows of tubes in planes parallel to the pitch of the tubes. It is possible to install these systems without changing or cutting the brickwork and walls, the original cleaning openings and internal wall angles in the side of the boiler, it is stated, permitting a wide swing of the nozzle head.

The nozzles are divided into groups that individually control the blowing units, one for each gas pass or compartment. They are fitted into each of the cleaning pockets originally provided along the sidewall for hand cleaning. Steam is received by the individual units from the superheater or from a 2-in. opening in the top of the main steam header. The steam supply line passes below the blowing units and is provided with a drain at the lowest point to enable any possible condensation to be removed prior to each blowing operation. The centrally located vertical riser is connected to the steam line for each unit, the control being by individual valves. From this riser short branches equal in number to the space planes between the horizontal rows of tubes extend inward and connect the riser with the swing joints. From the moving member of this joint a connection is made to the three-way nozzle heads within the furnace wall.

A vertical rock shaft located at the side of the riser is connected with the moving members of the swing joints through links and levers. A single operating handle is provided for each riser and when this is moved to rock the shaft the entire series of nozzle heads is swung back and forth, the steam escaping in three jets from each nozzle and sweeping the gas pass or compartment. While the swing joint is designed to permit easy installation, inspection and overhauling, it may be brought squarely against the cover shield which closes the cleaning pocket and tilted to the same pitch as the tubes, thus, it is emphasized, enabling the steam to sweep at all points within the plane spaces between



A Steam Soot Blower System for Horizontal Water Tube Boilers with Vertical Baffles. The Swinging Feature of the Nozzle Head is Indicated by Dotted Lines

the tubes. The swing joints are bolted to a metal cover shield which fits against and clamps to two strips on the wall plate, thus rendering the cleaning pocket air tight. The risers are divided in the middle by a blind coupling and separate steam supplies are piped to the top and bottom halves, this arrangement being relied upon to avoid possible inefficiency in boilers having many vertical rows of tubes.

### Grinding Machine Safety Devices

The Underwriters' Laboratories, Inc., Chicago, is to make thorough tests of the various devices now on the market for the protection of grinding machine operators. For this purpose a fund has been raised. The Underwriters' Laboratories has contributed \$500; the National Machine Tool Builders' Association, \$250, and the grinding wheel manufacturers of the United States and Canada, \$250. Co-operating with the Laboratories is a committee of the National Machine Tool Builders, composed of H. W. Dunbar, Norton Grinding Machine Company; C. D. Buell, Diamond Machine Company, and Hugh McGregor, Brown & Sharpe Mfg. Company; also the Grinding Wheel Manufacturers' Safety Committee, whose members are R. G. Williams, Norton Company, chairman; F. R. Henry, Dayton Grinding Wheel Company; G. W. Chormann, Carborundum Company; J. B. Baker, Safety Emery Wheel Company, and J. R. Kempf, Star Corundum Wheel Company. It is expected that it will take from one to two years to complete the tests and issue a report.

Nearly 375 Milwaukee manufacturers participated in a dinner and discussion of safety and sanitation in industrial plants given by the Merchants' & Manufacturers' Association of Milwaukee in the Auditorium on April 25. The principal speaker was Charles B. Scott, manager of the bureau of safety of the Middle West Utilities Company, and a director of the National Safety Council, Chicago. Arthur T. Morey, assistant to the president of the Commonwealth Steel Company, St. Louis, spoke on "The Value of Safety, Sanitation and Welfare in Industries." The feature of his talk was the statement that "there is no other movement in the world that has done so much for the welfare of the country as our own 'safety first.'"

# Remington Arms Power Plant at Bridgeport

How the Notable Economies Are Secured in the Large Turbo-Generator Plant—The Administration and Operation as Well as Equipment

**I**N the description of the large rifle and bayonet making plant of the Remington Arms-Union Metallic Cartridge Company, Bridgeport, Conn., which appeared in THE IRON AGE of Feb. 3, but little space could be given to the notable power plant of the company. It is located about opposite the center of the huge main building on the shore of a small cooling pond and was erected in remarkably quick time—70 days from the time the ground was broken until the first unit was in operation.

Notable use is made of synchronous motors to

ington works are divided into eight drives so as to reduce the size of motors and lessen the number of machines involved in case of trouble on any drive. Nearly all transmission from motors to main shafts is by silent chain drives. These have been found satisfactory when adequate attention is given to the lubrication of the chains.

All motors, with the exceptions noted below, are 220-volt 3-phase 60-cycle constant-speed induction type. There are 352 motors installed in the arms plant with a total of 7532 hp. Of these, 279 are for driving production machines, 15 for elevators, 6 in



At the Right of the Power House May Be Seen the Factory Buildings and at the Left the Source of the Condensing Water

correct current lag with consequent economies in many directions. Seven of these motors, of 190-kva. rating, are installed at various points in the plant, operating fans and blowers which are in continuous use. By using over-size and over-excited synchronous motors, these advantages are gained:

A leading current is produced to offset the lag of the induction motors.

A reactance load is produced so that a power factor of 80 per cent of the current generated is used in the energy load. In much of the Remington installation, 86 per cent is realized.

The current is corrected at the nearest point to the induction motors.

It lessens the cost of cables and transmission lines—no small item in a plant having 4500 miles of cables and wires.

It enables the use of smaller transformers, as the current is corrected before returning to the secondary switchboards.

## 1-HP. MOTOR CAPACITY FOR EVERY 100-LB. HAMMER RATING

In most instances the workrooms of the Rem-

steel storage buildings, and 7, besides the synchronous motors, for fans and blowers. There are 6 motor-generator sets furnishing direct current for charging storage batteries, for magnetic chucks, and for 32 d.c. variable-speed motors. The full list of motors installed and in reserve includes 20 10-hp., 79 15-hp., 135 20-hp., 65 25-hp., 63 35-hp., 4 50-hp., and 4 75-hp. motors. The two larger sizes are used only in the forge shops. There are not more than five hammers on any one motor. Several months of experience dictate that 1 hp. per 100 lb. rated weight of hammer is adequate.

## ECONOMIES BY STUDYING SHOP DRIVES

One man is constantly employed checking with an Esterline recording polyphase wattmeter the power requirements of drives. Studs are provided on the compensators for ready attaching the wattmeter. The original purpose was to make a scien-

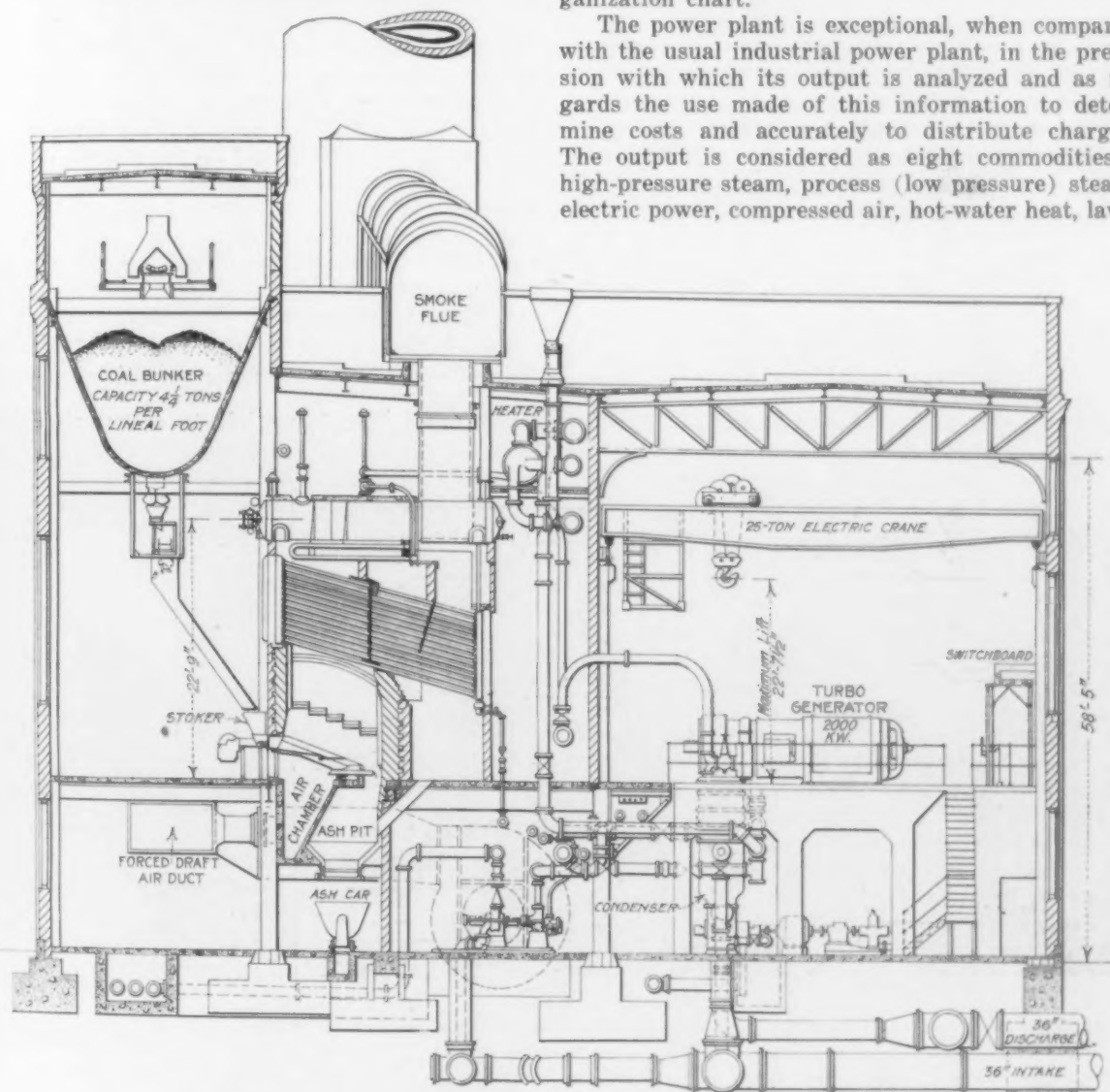
tific selection of motors to secure at least 90 per cent load factor, but in practice this checking has been found to furnish data for the prompt solution of problems and troubles which would otherwise be obscure.

One such case arose on the rifle-barrel roll drives. When first installed, 50-hp. motors were employed, but it was later determined that 25-hp. motors were adequate. Soon after the change was made, complaints began to come in about the rolls slowing down. As is so often the case, the motors were held responsible. By using a tachometer and wattmeter, it was quickly discovered that the motors were up to speed and delivering sufficient power.

By study of a number of checkings, it was found that a drive requiring 5 hp. with an open belt, required from 7 to 8 hp. with a crossed belt. Most of the motors are now so rotated that crossed belts are eliminated.

The power department organization now includes 347 men, distributed as follows: Office, 17; power house, 75; electrical maintenance, 89; electrical construction, 47; mechanical maintenance, 14; mechanical construction, 90; laborers, 6; fire department, 9. When the entire plant is fully equipped, there will probably be a decrease in the electrical and mechanical construction crews. The division of responsibilities and duties is clearly shown in the organization chart.

The power plant is exceptional, when compared with the usual industrial power plant, in the precision with which its output is analyzed and as regards the use made of this information to determine costs and accurately to distribute charges. The output is considered as eight commodities—high-pressure steam, process (low pressure) steam, electric power, compressed air, hot-water heat, lava-



Cross-Section of the Boiler and Turbine Rooms and the Basement

By changing the position of the shaft so that the roll drive was by an oblique belt in place of the original vertical belt, the belt slip, largely responsible for the trouble, was overcome. Then by increasing the speed of the rolls slightly and thereby creating a larger reserve of momentum of the fly-wheels, conditions were made wholly satisfactory.

As the induction motors will stand an extreme overload for a minute or two and a large overload for considerably longer periods, the selection of motors to meet the average load has been one of the most marked economies of the power installation. This method of selection is especially well shown by the accompanying chart of a grinding machine drive.

In the early equipment of shop drives, a considerable number of short crossed belts was used.

tory hot water, cold water, and drinking water. An interesting chart here reproduced shows the heat distribution in the most graphic manner.

The metering of output is carried out to a most unusual extent, a great variety of apparatus being employed. As a check upon costs and conditions, these records are invaluable and they play a large part in the successful operation of the plant as well as in the resultant economies. The following incomplete outline will give some idea as to how closely every detail is watched:

Coal fired: Weighed in automatic scales.

Boiler feed: Recording and indicating Venturi meter; indicating flowmeter on each boiler; recording thermometer checked by mercury indicating thermometer; mercury thermometers to show make-up and drip return temperatures; disk water meter on drip return.

Superheat: Two recording thermometers.



Flue temperature: Recording thermometer at each end of flue; pyrometer in each breeching, connected through a dial-type switching device with a Tyco's thermometer.

City Water: Disk meters of water company; two turbine meters in power plant; mercury thermometer for temperature.

High pressure steam: Recording flowmeter, thermometer and pressure gauge on main to arms plant; recording and indicating flowmeter on main to cartridge plant; recording pressure gauge on main steam header; indicating pressure gauges on each boiler; master indicating pressure gauge on firing aisle wall.

Condenser circulating water: Mercury thermometers on injection and discharge pipes.

Process steam: Recording and indicating flowmeter; recording pressure gauge.

Electric power: Integrating kilowatt-hour meters between generators and main bus; integrating kilowatt-hour meters on each feeder from main bus; integrating kilowatt-hour meters on 440-volt feeder for coal-handling motor and on 110-volt feeder for station lights; the difference between the readings of these two meters and the station service meter shows low-tension current used in auxiliaries employed wholly for factory service.

Compressed air: Recording flowmeter on air main; recording flowmeter on steam main to compressors.

Hot water heating system: Venturi meter, recording, integrating and indicating; recording and indicating flowmeter on heating main to cartridge plant; recording thermometers on circulating mains, out and return; turbine meter on heater drip return.

Lavatory hot water: Venturi meters, recording, integrating and indicating, on both outflow and return circulating mains; mercury thermometers on circulating mains, out and return.

Cold water: Venturi meter, recording, integrating and indicating.

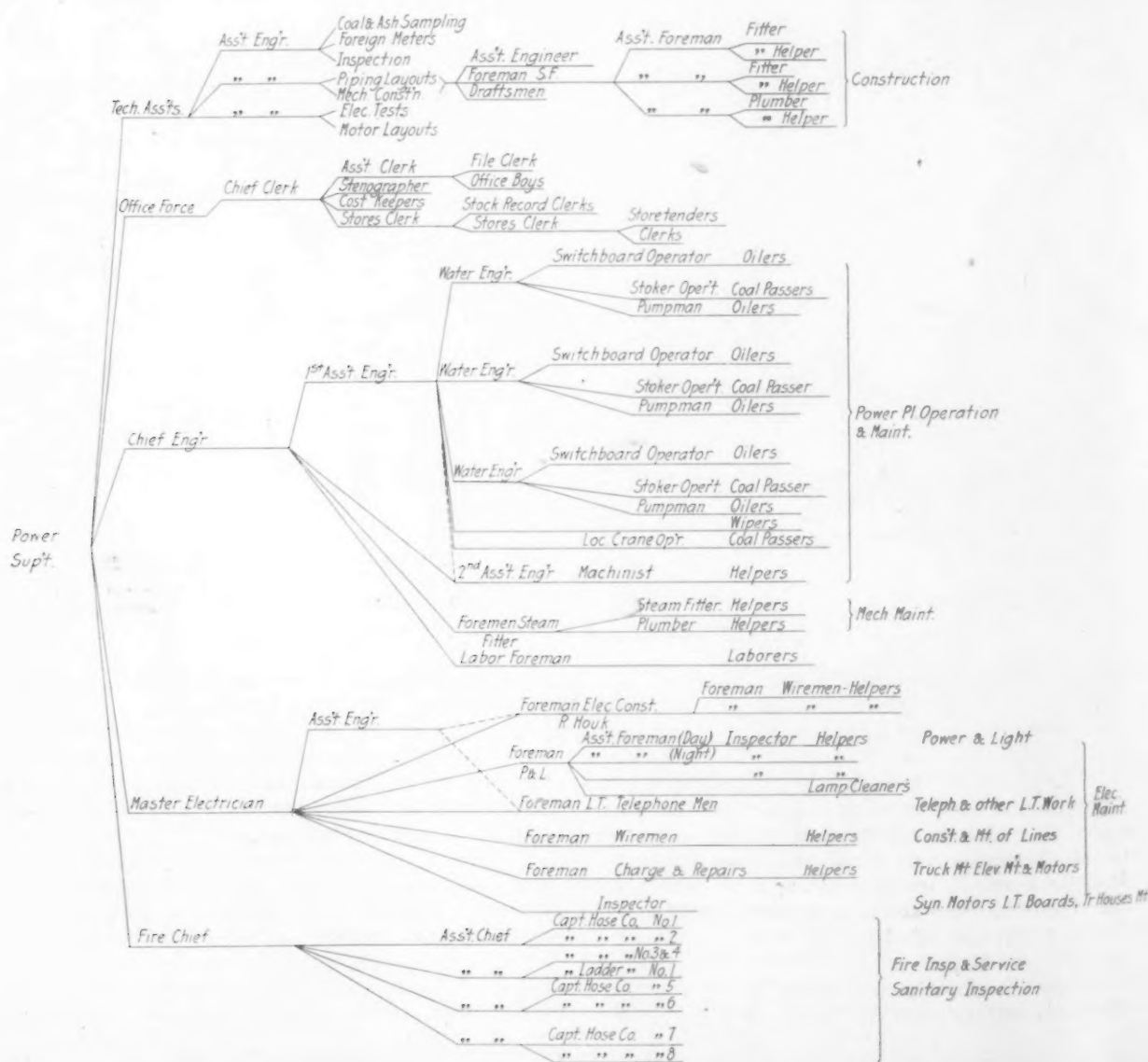
Drinking water: Disk meters on circulating mains, out and return; recording and mercury thermometers on outflow main; mercury thermometer on return main.

All kilowatt-hour meters and mercury thermometers are read at least once each hour, except the thermometers on the condenser circulation (read six times a day) and the thermometers which serve only to check recording instruments.

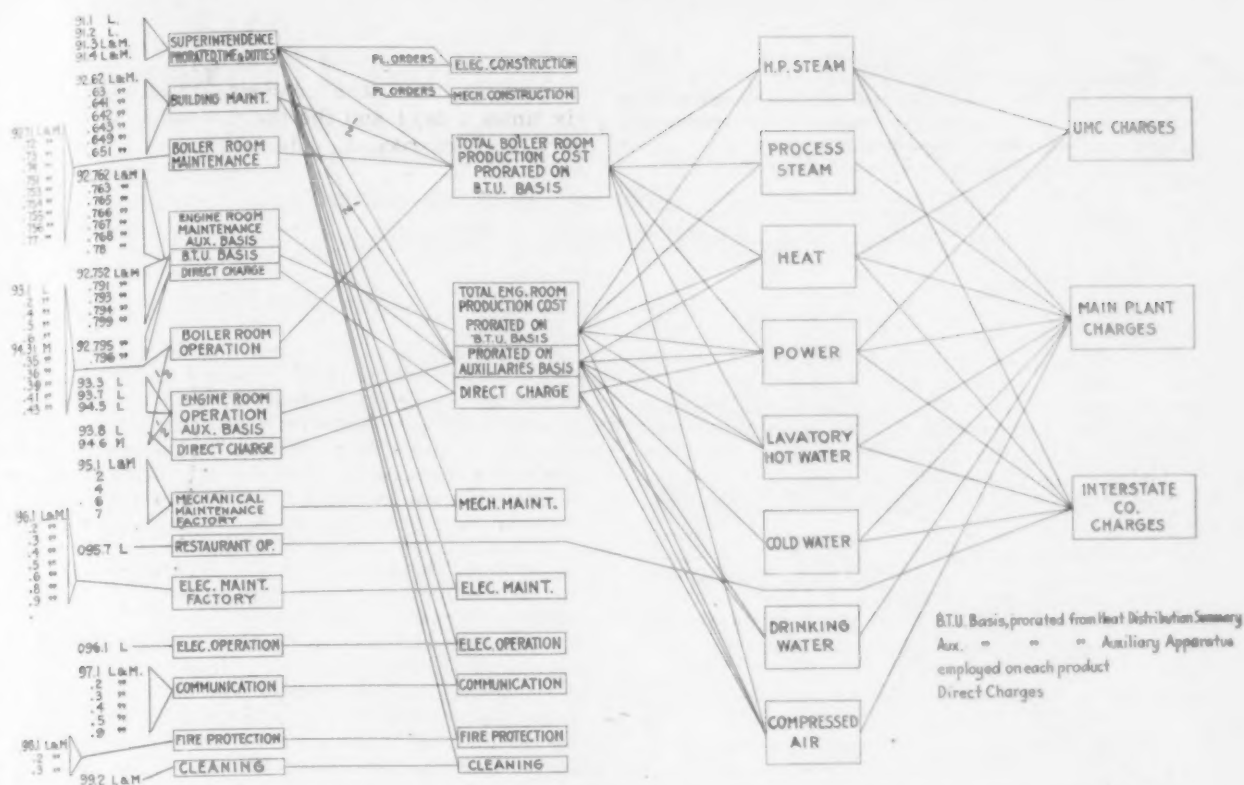
To make all this information available, many forms and charts are required. Differing from the usual practice, reports and forms are standardized on the usual letter-size sheet, 8½ by 11 in., and all drawings are made upon multiples of this size. This enables the use of standard and uniform binders. The engine-room log is kept on one of these standardized forms. The forms and reports are so printed as to assure the securing of all necessary information with a minimum amount of writing.

Some of the graphic charts, made by days and extending over a one-year period, are the net power output, steam made, coal fired, load factor and outside temperature. Factors charted by months, extending over a five-year period, are the net kilowatt output, use factor and load factor, outside temperature, city water, gas, and on a single chart the average, the maximum hour and the maximum 15-min. (capacity peak) loads. Unit costs are also similarly charted: on one chart the high-pressure steam, process steam, and factory heat; on another, the lavatory hot water, cold water, and drinking water; a third chart shows power and compressed air; a fourth chart shows the boiler efficiency and the actual evaporation.

While it is not possible to enumerate all the



Scheme of the Power Plant Organization



Scheme of Distribution of Charges. The Interstate Company Operates the Factory Restaurants Under Contract

forms used, it is worth noting that in such forms as the summary—made out daily and monthly—the records are made from precise data and the common error of “averaging the averages” is not permitted. The records kept are very illuminating, especially as to the source of obscure troubles and losses, and furnish a check upon time reports affecting various quantities of power or the machines involved.

With such complete records of quantities and costs, it is possible to make an accurate distribution of overhead and operating charges to each department. The power plant is particularly successful in charging to the factory all the output it receives. An accompanying chart shows clearly how the charges are distributed:

#### Some Interesting Statistics

Expected full load demand:	
High pressure steam generated, lb. per hr.	190,000
Power, kw.-hr. per day	160,000
Load, kw. (2300 kw. to cartridge plant)	8,800
Compressed air, cu. ft. per min.	3,000
To factory:	
High-pressure steam, lb. per hr.	50,000
Process steam, lb. per hr.	30,000
Hot water for heating, gal. per min.	5,000
Lavatory hot water, gal. per min.	300
Heat consumption, January, 1916:	
Steam made, B.t.u.	105,000,000,000
High pressure steam to factory, B.t.u.	10,000,000,000
Process steam to factory, B.t.u.	25,000,000,000
Factory heating, B.t.u.	41,000,000,000
Power, B.t.u.	28,000,000,000
The remainder to lesser activities:	
Factory contains 24,590,000 cu. ft.	
Glass surface from 42 to 48 per cent of walls.	
Maximum heat required per cu. ft. per hr. in zero weather,	
3.23 B.t.u.	
Heat developed from power sent to plant by friction of drives, machines and at cutting points of tools per cu. ft. per hr., 0.89 B.t.u.	
Power required (load) per sq. ft. of area, 4 watts.	

The cost of process steam per 1000 lb. runs about 10 per cent less than that of high-pressure steam and accomplishes substantially the same result for all purposes where it can be used. The effect of the use of process steam upon the cost of power is shown by the fact that a plant of this size with a straight power load would probably have a coal factor of about 2.25 lb. per kilowatt, whereas in this plant in the winter months the coal factor has been as low as 1.4. The real reason for this economy is regarded as lying in the alteration of the heat dis-

tribution. It is generally accepted that in a straight condensing power plant, from 27 to 35 per cent of the heat is lost in the boiler room. The actual heat arriving at the switchboard is from 8 to 11 per cent and the heat rejected to the condensers is from 50 to 65 per cent. By using bleeder turbines and diverting process (low-pressure) steam to the factory, from 17 to 20 per cent of the heat arrives at the switchboard and only about 15 per cent goes to the condensers. The use of a combination bleeder and mixed-pressure turbine prevents loss from the auxiliaries to the outside air, as excess process steam from the auxiliaries can be turned back to the mixed-pressure turbine.

The power house is 93 x 161 ft., 50 ft. high, built of steel, brick and limestone. At each end is a radial brick chimney, 200 ft. high and 12 ft. inside diameter. The turbine room is faced with buff pressed brick with a red-brown brick wainscoting, and has a terrazzo floor and baseboard. The other floors are of reinforced concrete. The outer doors are wood, copper covered.

At one end of the plant there is an open storage yard with capacity for 10,000 tons of coal and there is other available storage space for 10,000 tons more. A locomotive crane picks up the coal from the piles and loads it into cars which are dumped into a track hopper. From this hopper the coal falls into a crusher with a capacity of 35 tons an hour. From the crusher a bucket elevator carries the crushed coal to the top of the building where it is dumped upon an 18-in. belt conveyor. A traveling tripper unloads the coal into a bunker high above the firing aisle. This bunker is 141 ft. long and has a total capacity of 600 tons, 4¼ tons to each linear foot. A sample of each shipment of coal is automatically passed from the bucket elevator to a quartering grinder. A sample is selected and passed through another grinder which reduces it to fine particles for analysis. A chemical analysis is made of each shipment. The coal from the overhead bunker passes through automatic weighing

(Continued on page 1120)

# National Metal Trades' Record Convention

W. H. Van Dervoort New Head of Association—Experience Meeting Was of Great Interest—Industrial Inventory Commended

The eighteenth annual convention of the National Metal Trades Association at the Hotel Astor, New York, April 27 and 28, was the largest and in many respects the most important in its history. The registration showed a total of 372 in attendance, but not all those present were recorded. The atmosphere was permeated with a sense of the grave labor troubles which confront the metal-working industry, consideration of which dominated a major part of the proceedings.

W. H. Van Dervoort, Root & Van Dervoort Engineering Company, East Moline, Ill., was elected president of the association, succeeding Herbert H. Rice, Waverley Company, Indianapolis, Ind. Other officers elected are as follows: First vice-president (re-

engrossing the attention of employers, and ventured into the future.

"It can hardly be said of our association that this has been an uneventful year. From 5 strikes in 1914 to 67 strikes among our members in 1915, not to count those outside of our membership but in which we are interested, is a considerable increase in business. Those of you whose business has doubled or trebled can imagine the situation in which we found ourselves.

"Present conditions have made new demands on our office with which it has been impossible to keep abreast. We have done the best we could. The commissioner and secretary have worked at high pressure, as indeed have all the office and field force.

"Neither the commissioner nor your council makes any claim to unusual powers of discernment, but it would be strange indeed if those who have these labor problems put to them daily should not from experience gather a fund of knowledge in the psychology of strikes in general, and of the present strikes in particular—for this has been a time peculiar to itself. A few simple but fundamental principles were stated at the beginning as applicable to the present difficulties and events have proved them correct.

## WHAT RECENT MONTHS HAVE PROVED

"1. The agitation for eight hours was not a demand on the part of the men but of the union officials. The men, of course, were glad of overtime rates after eight hours as they would be after six or four, but they wanted and gladly accepted the chance to work longer than eight. Incidentally, what has become of the argument that as much can be produced in eight as in nine or ten hours, when everyone who is busy works over eight except those who try to run three shifts?

"2. What the men wanted was larger wages—not shorter hours, except in name.

"3. It would not be possible to run three eight-hour shifts generally or even for a few to do so. Those who tried it have not been able to fill the third shift even at special wages. In fact, many found it difficult to fill a second shift.

"4. Concessions would lead to further demands. In almost every case such was the result.

"5. That while the occasion required longer hours and not shorter it was the time for higher wages.

"6. That the proper way to give increases was for individual merit and by bonuses, premiums, and payments for efficiency and production.

"7. That though we were opposed to horizontal increases there were instances when it seemed the only thing to do.

"In the light of events these statements seem to have needed no proof, but so little do most manufacturers think of their labor problems that many had to be argued with, sometimes without effect.

"Speaking generally, this is the story: Everybody quiet and on short time. War breaks out and a semi-panic seizes business. Then almost overnight a resumption of trade in machinery lines, and lo! everybody is busy all at once. The big munitions plants begin bidding up the price of labor to rates unheard of in our day. Careless for the most part of the future—of principles, of hours or of wages—everything is sacrificed for immediate gain and often in total disregard of other industries and manufacturers.

"But of that attitude we can say little. Have not our fellow manufacturers, even our own members at times, shown an inclination to follow this example when their own business became so much better than they ever dreamed?

## From Report of President H. H. Rice

What developments of the past year in labor disputes have proved:

The agitation for eight hours was not a demand on the part of the men, but of the union officials.

What the men wanted was larger wages—not shorter hours, except in name.

It would not be possible to run three eight-hour shifts generally.

While the occasion required longer hours and not shorter, it was the time for higher wages.

The proper way to give increases is for individual merit and by bonuses, premiums, and payments for efficiency and production.

elected), George Mesta, Mesta Machine Company, Pittsburgh; second vice-president, J. W. Higgins, Worcester Pressed Steel Company, Worcester, Mass.; treasurer (re-elected), F. C. Caldwell, H. W. Caldwell & Son Company, Chicago, Ill.

Councillors to serve two years were elected as follows: B. F. Tobin, Continental Motors Company, Detroit, Mich.; H. N. Covell, Lidgerwood Mfg. Company, Brooklyn, N. Y.; Murray Shipley, Lodge & Shipley Machine Tool Company, Cincinnati, Ohio; R. H. Jeffrey, Jeffrey Mfg. Company, Columbus, Ohio; H. B. Kennedy, Hoggson & Pettis Mfg. Company, New Haven, Conn.; Theodore O. Vilter, Vilter Mfg. Company, Milwaukee, Wis.

Herbert H. Rice, the retiring president, was elected a councillor to fill the unexpired term of J. W. Higgins, who has been made second vice-president. The term expires in 1917.

## Report of Retiring President Rice

President Rice called the convention to order, and in the course of the usual preliminaries named the convention committees which are given elsewhere. His report, which follows, summed up not only the activities of the past year but touched upon the questions now



## GUIDANCE FOR IMMEDIATE FUTURE

"What of the immediate future? Those who predict will do well to speak in oracles, but a few things may be said with assurance.

"1. No one who does not wish to do so need change his hours. Everywhere men are working overtime and it becomes a matter of wages—not of hours. Some have thought that a change to overtime pay after eight hours would leave them with a lower hourly rate when times become normal. So it would, if they did not have to increase the hourly rate now as all have had to do either individually or collectively. In not one single instance do we know of anyone getting away with an overtime rate only.

"2. The men have no grievances and do not wish to strike. The union is in no condition to fight and has notified local lodges they would have to finance themselves if they wished to call strikes.

"3. Where wages are right and in accord with present demand (and where they are not they should be made so), there is no occasion for anyone being stampeded into making changes in fundamental working conditions because he 'read in the paper' that everybody was changing to eight hours, when as a matter of fact not 1 per cent are actually working eight hours and not 5 per cent are nominally doing so.

"What would you think of a manufacturer who insured in the same mutuals with you and who let his shop get into an untidy condition with his extinguishers empty, his sprinkler system out of order and careless fire hazards everywhere? You would say that he owed an obligation to yourself and the other mutual members, and that he was not entitled to assistance in case of fire.

"Are you such a member of the Metal Trades Association? Do you give the labor conditions in your shop any attention until you hear of rumors of organization and demands? Are you one who makes no effort to determine the character and previous history of new men who are put on, and do you take an interest in the physical condition of your shop and in the treatment accorded to men by their foremen so as to have the good will of the workmen as a strong asset?

## MANUFACTURERS ARE INTERDEPENDENT

"We are sometimes asked what are the obligations of the association to a member. It is quite pertinent to reverse the question. What are the obligations of the member to the association? Hours and wages, it is true, are matters of local and individual concern, but no man can make changes at a time like this without affecting all about him and if he makes changes without consulting his association as to whether such changes will accomplish what he is after, whether they are necessary, whether the men want them in the way the unions propose, whether if granted they will decrease or increase the likelihood of further demands, he is just as foolish as the manufacturer who does not ask his attorney's advice before taking important legal steps. Your membership in your association entitles you to the combined experiences of all the other members and may be had for the cost of a two-cent stamp.

"The relation of the branches to the national body is most harmonious, but the association would be infinitely stronger if arrangements were made to have all secretaries answerable to and even appointed by the national office. The National Association returns to the branches one-half of all dues, but has little or no voice in the expenditure of that money. Requests may be made but no orders given. A closer relationship would stimulate activity in the branch itself, and would open the way for the training and promotion of secretaries from smaller to larger fields. A committee has been appointed to consider this question. I recommend that in co-operation with the branch presidents and the secretaries themselves some plan shall be adopted and tried in at least a few of the branches at once.

"Where possible, and it seems as if it should be possible, in every branch, I recommend a rotation in office, a practice already in vogue in some branches. This acquaints more members with the work of the branch and of the national and a man never loses interest

after having served the association. The council has passed a resolution expressing its opinion that in no case should a branch president be other than a manufacturing member and should never be a salaried officer of the branch.

"A committee has been appointed to consider our Declaration of Principles. It may be that no change can be made to advantage, but after 17 years it is proper to consider the subject. Our attitude on arbitration at least needs to be clarified.

## WIDE SCOPE OF CONFERENCE WORK

"Committees have been active in so-called conference work with other associations in safety and sanitation, training of apprentices, industrial education, publicity, and in legislation; and now a new board of wider scope is starting under the name of the Industrial Conference Board.

"These boards indicate a closer relationship and better understanding between national associations and are means of co-ordinating and amplifying the efforts of all, in those matters common to all. The following associations are not all members of each conference board, but all are members of one or more: National Erectors' Association, National Founders' Association,

From Report of  
President H. H. Rice

Speaking generally, this is the story:  
Everybody quiet and on short time.

War breaks out and a semi-panic  
seizes business.

Then, almost over night, a resumption  
of trade in machinery lines, and,  
lo! everybody is busy all at once.

The big munitions plants begin bidding  
up the price of labor to rates unheard  
of in our day.

Careless for the most part of the future—  
of principles, of hours, or of wages—  
everything is sacrificed for immediate  
gain, and often in total disregard  
of other industries and manufacturers.

National Association of Manufacturers, American Anti-Boycott Association, National Association of Cotton Manufacturers (North), American Cotton Mfg. Association (South), National Association of Woolen Manufacturers, American Silk Association, United Typothetæ of America, American Foundrymen's Association, Council for Industrial Defense.

"The convention does not offer opportunity to more than mention the activities or even have reports from all our committees. In legislative matters we always interest ourselves through our branches and the national office in those subjects which pertain to labor and efficiency.

## TAVENNER BILL MUST BE OPPOSED

"This year your attention is particularly called to the fight which will again be made through such bills as the Tavenner bill and probably through riders to all of the appropriation bills which will endeavor to forbid the use of time studies or the payment of bonuses, premiums or piece rates in Government work. This is a serious matter and you should not fail to make your views known to your Congressmen.

"The result of the joint committee appointed to follow the hearings of the Industrial Relations Commission should have special mention since its work is now finished and was so successful. The committee through its counsel, Walter Drew, was able to get in the records

much favorable testimony which would never have been in without our effort, and which it is suspected was not welcomed by the chairman and some others on the commission. It showed some testimony in its true light by suggesting pertinent questions. I may say it even educated some of the members of the commission by supplying them information with the result that the chairman, whose outbreaks in speech and print merited the ridicule they received, found himself and his friends on the minority side of the report. And last of all our committee has made known to Congress the attempt on the part of Chairman Walsh to make it appear that the minority report was the majority report and get it published as such.

"The freedom offered the investigators of the Federal Trades Commission to make themselves at home in our office and acquaint themselves with every activity of our association was an answer in itself to those who hoped to find objectionable activities on our part."

Mr. Rice paid a tribute to the efficiency and loyalty displayed by Commissioner Hibbard and Secretary Sayre, also spoke highly of the work of his associate officers and of the labor department and the office force. A short address was made by W. A. Drewett, president New York and New Jersey branch of the association.

Reports by Frank C. Caldwell, treasurer; John D. Hibbard, commissioner, and Homer D. Sayre, secretary, were submitted. The reports of F. A. Geier, Cincinnati Milling Machine Company, chairman of the Committee on Industrial Education; and of W. A. Viall, Brown & Sharpe Mfg. Company, chairman of the Committee on Apprenticeship, were submitted in printed form.

#### Apprenticeship Committee Report

The report of the committee headed by Mr. Viall treated largely of the work done in the matter of apprenticeship by the Conference Board on the Training of Apprentices. The report is in part as follows:

"Among the recommendations that the board has made during the year are:

"(a) That the applicants for apprenticeship shall receive a physical examination. As time goes on more and more stress is laid and is going to be laid upon this thing in connection with the apprentices in particular, because in starting young men upon their life's work there should be no mistake made as to their ability to carry out the work upon which they are entering as far as their health is concerned.

"(b) Apprentices should have at least a grammar school education.

"(c) Apprentices should be provided with classroom instruction, either in class-rooms established in the factory and managed by the employer, or in class-rooms jointly established and managed by employers, or in public or private educational institutions under the joint control of educators and employers.

"(d) Class-room instruction should be given during working hours.

"(e) Apprentices should be paid for the time in which they are in class-rooms. If the hours in class instruction are not during working hours they should be paid for the time that they put in in the evening.

"(f) Apprentices should be paid only such wages as are stipulated in the agreement, and should not participate in piece work nor bonus work.

"(g) A trial period of not less than 1000 and not more than 2000 working hours should constitute the trial period for apprentices.

"(h) Apprentices should be placed under the supervision of a person capable of training them. This recommendation follows very closely the recommendation that your committee has made from time to time.

"(i) Apprentices should not be required to make a deposit at the time of entering their apprenticeship term, but should receive a bonus at the end of their term.

"Your committee is well aware at this time that most of the manufacturers are so busy, and are so beset by the troubles incident to this period of activity, that they feel that they cannot give the time and attention that is necessary for the consideration of the apprenticeship question. Your committee has not changed its mind, however, as to the necessity and advisability of

training men in the broader sense; and no period has brought out more strongly than the present the need for trained men to guide the inexperienced and the specialized work. When untrained men are able to make the wages that are possible at the present time, we know that it is not very attractive for a young man to engage at a price that we find is just to pay an apprentice; and such a thing can appeal to the young man only when he and his family have a conception of the possibilities of the young man's future presented to them in such a way that they can see that these possibilities are of far greater value than the immediate temporary gain."

#### Deplore Demise of M. H. Barker

F. C. Caldwell, H. W. Caldwell & Son Company, Chicago, read a resolution which had been passed by the St. Louis branch deploring the recent death of Melville H. Barker, who was at the time of his demise an honorary member of the Administrative Council, and offered one of similar tenor to the members of the national body. H. W. Hoyt, Great Lakes Engineering Works, Detroit, Mich., seconded the resolution in an address which expressed great feeling and by a rising vote it was adopted.

#### Must Keep Lawmakers Posted

F. Fosdick, Fitchburg Steam Engine Company, Fitchburg, Mass., urged the members to keep in closer touch with their representatives at Washington, saying that Washington needs to know what business interests require. H. P. Eells, Cleveland, said he regarded the suggestion as a most important one, and that in the Chamber of Commerce of the United States, the members had an effective medium through which they could make their views known. Winslow Blanchard, Blanchard Machine Company, Cambridge, Mass., referred to the surprising degree to which business men were not familiar with the names of their Congressmen, and told of one organization which, in urging that letters be written to Congress, simplified matters by sending the name of the representative.

#### The Metric System

F. A. Halsey was granted the floor for a brief address in opposition to the imposition by legal enactment of the metric system on manufacturers. He said that emphasis is now being laid by the proponents of the metric system on its alleged necessity in connection with export trade. Mr. Halsey quoted James L. Slayden, member of the House Committee on Coinage, Weights and Measures, as saying at a recent meeting of that committee: "If we do business with South America we have got to do it on that system." Describing a census of the South American machine shops made under the auspices of the *American Machinist*, Mr. Halsey said:

"This census shows that of the machine tools in South America, 39.3 per cent are of American, 43.2 per cent of English, and the remaining 17.5 per cent of German, Belgian and French production, the total being 82.5 per cent made to English and 17.5 per cent to metric measure. We are always told that the countries of South America are solidly metric, the only exception being British Guiana. They have the markets of the world from which to buy, and no one in this audience will claim that German machine tools are not good tools. Nevertheless, these metric countries buy machine tools made to English measures, in preference to those made to metric measures in the ratio of nearly six to one. We have here, in brief, the littleness of the export trade argument."

Mr. Halsey took emphatic exception to statements made by Dr. Stratton, Director of the Bureau of Standards, in a report entitled "The Metric System in Export Trade." From Dr. Stratton's report he quoted: "Some well-meaning men have urged that English measures were working well enough, and that a change would be all but impossible. Yet the very firms concerned are using the metric system for their own profit. Not more can be asked." Mr. Halsey then continued: "Mr. Sharpe is a well-meaning man 'who has urged that a change would be all but impossible,' but he makes



metric micrometers, gages, reamers and other tools for sale abroad, and he has thus shown that his difficulties are imaginary."

In contending that our currency system is not altogether decimal, Mr. Halsey gave the following table of coins:

- 3 cents make a nickel
- 2 nickels make a dime
- 2½ dimes make a quarter
- 2 quarters make a half dollar
- 2 half dollars make a dollar

Henry D. Sharpe, Brown & Sharpe Mfg. Company, Providence, R. I., also spoke in opposition to the enforced adoption of the metric system and said that he was in accord with the facts of the arguments which had been heard. He said manufacturers should assert themselves when they see metric propaganda in print. The following resolution was presented to the meeting, and on being favorably reported at a later session, was adopted:

*Whereas*, The system of weights and measures long established in the United States and in all English speaking countries has been attacked by numerous parties who are desirous of imposing upon American industry the metric system, and

*Whereas*, The Director of the Bureau of Standards has issued a report on "The Metric System in Export Trade," published as Senate Document No. 241, which gives an erroneous idea of the necessity of fostering the use of the metric system because of our participation in foreign trade, and

*Whereas*, Several bills have been introduced in Congress purporting to promote uniformity in weights and measures, but inimical to the long established system, and

*Whereas*, The engineering industry, comprising the membership of the National Metal Trades Association, is vitally concerned in the conservation of the existing system and realizes that the fostering of any foreign standards means confusion to industry instead of promoting uniformity, and

*Whereas*, The several engineering societies participating in an inter-society committee, to consider the feasibility of the adoption of the metric system, following an agitation promoted by scientists and others, do not fully appreciate the vital importance of this question in its industrial aspects as well as in the habits of people; it is hereby

*Resolved*, The National Metal Trades Association, in convention assembled, deploras the continued agitation of a subject which would deprive American industry of a substantial uniformity heretofore enjoyed in its use of weights and measures and points with pride to a great foreign trade already secured by the ready adaptation of our products to the needs of the foreign buyer without any legal enactment or Government supervision, and be it

*Resolved*, The efforts of Government either through statutory enactment or through administrative action should be the promotion of uniformity on the basis of present universally used units instead of the encouragement of any new units, and be it further

*Resolved*, The sense of this convention be conveyed to the members of the Inter-Engineering Society Committee, to the committees of the House and Senate on Coinage, Weights and Measures, to the secretaries of the departments of the Treasury and of Commerce, and to the press.

The Thursday afternoon meeting was in the nature of an experience meeting at which a number of mem-

bers related the details of their labor troubles. It was stated in the program that this session might be the most helpful part of the convention, and the statement proved to have been well justified. Many points of great value were brought out.

#### Address by M. W. Alexander

At the Friday morning session Magnus W. Alexander, General Electric Company, West Lynn, Mass., spoke on the work of the various conference boards in which he has so important a part, including those on safety and sanitation and training of apprentices.

Among other things, he said that manufacturers have been negligent in not accomplishing what Germany has done and to which in part, at least, can be attributed that country's high plane of industrial efficiency. American manufacturers have begun to realize the need, however, and are taking up in a broad way the subject of training apprentices, work that requires careful procedure to insure a proper foundation. The Board on Training Apprentices has standardized an apprenticeship agreement, the problem in this case being to devise a form that will not scare the apprentice, or his parents or guardian, yet will be so framed as to be entirely clear to them.

Specialized training courses are being worked out. With reference to the many employees lacking training, Mr. Alexander said it rests with manufacturers to ask themselves what they are doing to correct the situation, that if the public school system did not give the type of young men and women wanted, it was for the manufacturer to train them himself. Incidentally, he said that better results have been obtained from privately conducted trade schools than from some conducted by the authorities. Small manufacturers, by co-operating and establishing a school at some central point in their community, can get the benefits to be derived from such training, as was done at Bridgeport, Conn., some years ago. In that city a school proved so successful that it was taken over by the State.

Mr. Alexander referred to the good work of the Conference Board of Physicians in Industrial Practice. He strongly advocated physical examinations to determine for what particular work an applicant for employment is best adapted, something the employer owes

not only to himself, because of the liability laws, but also to society. There are places for many of those who may be deficient in one way or another. Both work and workers should be classified, and to that end an examination card had been devised which sets forth the physical condition of the applicant, not omitting the teeth, which Dr. Alexander pronounced very important. Only five or six minutes had been found necessary to examine an employee.

#### FEW STRICTLY OCCUPATIONAL DISEASES

As to occupational diseases Dr. Alexander quoted the opinion of a medical authority to the effect that,



WILLIAM H. VAN DERVOORT

The new president of the National Metal Trades Association was born at Ypsilanti, Mich., in 1869. He was graduated from the Michigan State Agricultural College as bachelor of science in 1889 and from Cornell University as mechanical engineer in 1893. He was connected with the mechanical engineering department of the Michigan State Agricultural College succeeding his graduation, serving as an instructor and later as assistant professor, and in this period he studied factories and factory methods in New England and Great Britain. He was assistant professor of mechanical engineering at the University of Illinois from 1893 to 1899, when he organized the Root & Van Dervoort Engineering Company at East Moline, Ill., devoted to the manufacture of stationary and portable gasoline engines. He was made president and manager. Four years later he organized and became president and manager of the Moline Automobile Company. He is known as a specialist in gas engine design and manufacture and has visited South America in connection with the extension of the gasoline engine trade. He was a member of the committee on management of the former American Motor Car Manufacturers' Association in 1908 to 1911, and was president of the Society of Automobile Engineers in 1915. He is the author of "Machine Shop Tools and Shop Practice."



with the exception of caisson disease, no disease can be said to be solely attributable to industry. So-called occupational diseases frequently originate outside of industry, and the speaker cited cases to prove the point. The eminent medical man Dr. Alexander alluded to had come to the conclusion that he would hesitate to define an occupational disease.

Dr. Alexander predicted a splendid future for the Industrial Conference Board which aims at the industrial prosperity of the United States, and may indicate a way out of the difficulties now confronting the industrial world.

### Important Resolutions

The following resolutions were adopted without dissent:

#### AGAINST THE TAVENNER BILL

*Whereas*, There is now pending in Congress House bill 8665, known as the Tavenner bill, to regulate the method of directing the work of the Government employees, the object of which is to prohibit at the Government arsenals what are known as time studies and premium payments, and

*Whereas*, This association fully agrees with the facts and request set forth by the Hon. Newton D. Baker, Secretary of War, in a letter to the Speaker of the House of Representatives under date of April 20, 1916, therefore be it

*Resolved*, That this association notify the Committee on Military Affairs of its disapproval of said H. R. bill 8665, and that our members do all in their power to help the defeat of this bill and to strengthen the hands of the Secretary of War.

#### FOR DEFENSE INVENTORY CO-OPERATION

*Whereas*, The Naval Consulting Board, composed of foremost inventors and engineers, has been created to assist the Government in the making of plans for national defense, and

*Whereas*, The co-operation of the nation's industries in achieving adequate defense undertakings is of the utmost importance to the country contemplating the vast supplies needed in time of national peril, and

*Whereas*, The several engineering societies are co-operating to furnish an inventory of industries which may be available as sources of supply in time of the nation's need, committees of engineers have been appointed in various states to direct the making of such an inventory; be it therefore

*Resolved*, The National Metal Trades Association, in convention assembled, heartily indorses the making of an inventory of industries as a most important feature in industrial preparedness, which not only should result in a better knowledge of sources of supply for the Government, but also will assist our own members to a better realization of the possibilities of their own manufacturing plants, and be it

*Resolved*, The several members of the association are urged to heartily co-operate with their own State committees in furnishing desired information which will make the industrial inventory possible.

James A. Emery, counsel National Council for Industrial Defense, gave an inspiring address on "Industrial Preparedness." His illuminating views of what may be expected after the termination of the war, and what must be done and avoided to enable this nation to retain and increase its share of foreign trade, and to cope with foreign competition are given, practically in full, elsewhere in this issue of THE IRON AGE.

### Personnel of Convention Committees

The convention committees consisted of the following:

**Credentials.**—Chairman, W. D. Tynes, Hardie-Tynes Mfg. Company, Birmingham, Ala.; F. P. Johnson, Detroit Screw Works, Detroit, Mich.; William Rowan, Jr., Motors Mfg. Company, Muskegon Heights, Mich.

**Resolutions.**—Chairman, Justus H. Schwacke, William Sellers & Co., Inc., Philadelphia, Pa.; George I. Alden, Norton Grinding Company, Worcester, Mass.; H. W. Hoyt, Great Lakes Engineering Works, Detroit.; L. C. Walker, Aermotor Company, Chicago, Ill.; H. E. Goodman, Goodman Mfg. Company, Chicago.

**Constitution.**—Chairman, Frank K. Copeland, Sullivan Machinery Company, Chicago; B. F. Tobin, Continental Motors Company, Detroit; A. E. Newton, Reed-Prentice Company, Worcester, Mass.

**Auditing.**—Chairman, William M. Beldman, Shraw-Kendall Engineering Company, Toledo, Ohio; Franklin Farrel, Jr., Farrel Foundry & Machine Company, An-

sonia, Conn.; J. R. Kilbourne, Kilbourne-Jacobs Mfg. Company, Columbus, Ohio.

**Convention.**—Chairman, F. C. Breakspear, A. G. Spalding & Bros. Mfg. Company, Chicopee Falls, Mass.; G. A. Kissel, Kissel Motor Car Company, Hartford, Wis.; E. J. Ross, Dibert, Bancroft & Ross Company, Ltd., New Orleans, La.; P. R. Greist, Greist Mfg. Company, New Haven, Conn.; G. W. Mixter, Deere & Co., Moline, Ill.

### Features of the Banquet

The convention banquet was held Thursday evening and the attendance exceeded all expectations. Mr. Rice presided. The only speaker was Alexander Dana Noyes, financial editor of the New York *Evening Post*, who spoke of financial and industrial conditions. He said that the Associated Press had taken a poll of German manufacturers on the question of wages and the consensus of their opinion was that present wages in Germany will be maintained after the war ends.

One of the features of the dinner which pleased everyone was a demonstration of the long-distance telephone arranged by the New York Telephone Company. It was preceded by an address in which W. F. Schmidt of the Telephone Company related some of the problems overcome in connecting coast with coast by wire, the speaker being assisted by motion pictures. Music and the roar of the Pacific breakers were transmitted over the wire. The applause of a group in San Francisco was plainly heard, and applause sent back from New York. Chicago and other intermediate cities were talked with also. H. H. Rice extended felicitations to Constant Meese, president California Metal Trades Association. W. H. Van Dervoort talked with John A. McGregor, president Union Iron Works Company, San Francisco. James A. Emery and William Barr, president National Founders' Association, among others, held conversations with persons in San Francisco on subjects pertinent to the metal trades.

The convention was attended by a considerable number of members of the National Machine Tool Builders' Association, who took advantage of the opportunity to hold a conference. They met at the Hotel Astor on the morning of April 29.

### Export Suggestions from the Government

The insistent demand for information on foreign-trade subjects has led to the publication of a book of practical suggestions by the Bureau of Foreign and Domestic Commerce, Department of Commerce. These suggestions are not concerned with the sale of any particular lines of goods in foreign markets, but with vexing problems which sooner or later confront exporters in every line. A wealth of practical information is given, under the following headings: Export Policies, Representatives and Agencies, Finances and Credit, Quotations, Postal Services, Correspondence and Translations, Co-operation with Consuls, Packing, Advertising and General Trade Extension. Contributions are included from consuls, commercial attaches, traveling special agents, from special agents in charge of district offices of the Bureau of Foreign and Domestic Commerce, and from Dr. E. E. Pratt, chief of the Bureau. The title of the new bulletin is "Export Trade Suggestions," Miscellaneous Series No. 35, and it contains 141 pages. Copies may be purchased at the nominal price of 15 cents each from the Superintendent of Documents, Washington, D. C., or from the district offices of the Bureau.

Local Council No. 20, National Safety Council, has been organized in Baltimore, Md. Plans are being made to have every industrial concern take an active part in the association. The following officers were elected at a meeting held last week: President, Louis Stratton, National Enameling & Stamping Company; vice-president, M. Harris, assistant manager of Accident Prevention, Sanitation and Relief of the Maryland Steel Company; secretary, Howard C. Hill, secretary Maryland State Industrial Accident Commission; treasurer, H. C. Stanwood, manager Workmen's Compensation Service Bureau.

# What Industry Faces Within and Without\*

## Stiff Competition for Our Domestic Trade and Not Demand from Abroad—Class Legislation Choking Efficiency and Production

BY JAMES A. EMERY

This nation faces war, not a sanguinary contest between thundering cannon, but an economic contest between the commercial and industrial forces of the Old World and the New, a desperate contest of economic methods and organizations for the market places of mankind, a battle that began with the first traders and will continue as long as men produce more than they can consume.

Crowded nations of Europe must market that which they do not consume, or those who produce it cannot live. Foreign trade is as essential to the national life of Europe as daily toil to the manual laborer. Trade supremacy meant to the dominant nation not merely fortune and power, but a prosperous and contented people. To the nation curtailed, restricted and forced from its place in the sun, its population must retire into agriculture if it can, and if it cannot, unemployment extends through industry in exact proportion to the denial of a market for its people's products, and that means all the social ills that afflict workless people—hunger, discontent, disorder and revolution.

These circumstances, so characteristic of the Old World, have had no counterpart within our boundaries. Easily self-supporting, the internal development of our rich and extensive area so concentrated our attention that, extraordinary as has been the expansion of our commerce and industry, we exported at the outbreak of the European conflagration but 5 per cent of our production. Now, overnight, our foreign trade has expanded beyond our dreams. Pause to calculate it,—it doubles as we exercise our pencil. Not alone have we supplied the belligerents who had access to our markets with all the thousand needs with which their industry, diverted to military preparation, was unable to provide, but neutral nations, their former markets closed, have turned to us.

### IMPENDING COMMERCIAL CHALLENGE OF DESPERATE NATIONS

A brief comparison tells the story of our rise and its causes, and likewise offers a sobering parallel of a descending scale of trade with normal nations: Our European exports during the first nine months of 1913 were substantially \$1,733,400,000; during the same months of 1914, these exports decreased \$330,000,000, and in the same months of 1915 showed an increase over the preceding year of \$1,065,000,000. Yet our Japanese trade was \$3,500,000 less for the month of October, 1915, than for the corresponding month in 1913. Our exports to Argentina, Brazil and Chile, by the same comparison, were \$2,000,000 less. Yet, normally, Argentina alone, with 7,500,000 population, presents a greater buying capacity than China with 500,000,000 population.

It must, then, be apparent that if peace comes within a reasonable time, unless Europe fights herself into helpless exhaustion—an almost unbelievable contingency—we shall face not an imperative demand for a huge volume of exports, but the commercial challenge of desperate nations, driven by economic necessity to recover their lost trade, trained hard and lean, and fortified with unprecedented industrial experience, which manufacture for self-defense has brought to each belligerent power, and disciplined in self-sacrifice and ordered efficiency in the sternest of all schools—war.

### THE UNITED STATES A TEMPTING TRADE PRIZE

True it is that there are many unknown factors in the prognostication. It is not the part of wisdom

\*From an address delivered before the National Metal Trades Association, New York, April 28.

gratuitously to presume them to be favorable when we face facts clearly within our vision that weaken our competitive capacity. Certainly, with peace, our problem will be not only to hold as much of our foreign markets as we may, but to preserve intact, if we can, our domestic market, the most tempting trade prize in the world, for the buying power of this nation is the greatest of the two hemispheres. It seems to me there are special reasons for believing it will be sought, particularly by that nation which has demonstrated extraordinary industrial efficiency—Germany. The story of her rise is significant. In 1870, her export trade was but \$350,000,000 a year; at the outbreak of this war she exported \$2,500,000,000 worth of commodities per annum. At the present moment her industrial structure is intact. Her loss of operating force by the casualties of war is undoubtedly very great, but the productive capacity of man, now at its zenith, has never yet been spurred to its full power, and human ingenuity supplies a million ghostly fingers to multiply indefinitely the productive power of the human hand.

### AMERICAN MARKETS THE AFTER-WAR GERMAN GOAL

Germany possesses Belgium, the workshop of Europe; she controls four-fifths of the iron and steel supply; three-fifths of the coal supply of France; in her hands is the Pittsburgh of Russia, from Libau to Warsaw. And she has lost, and lost for a generation, if human nature and the proclamations of the Allies can be relied upon, her greatest customer in Europe—Great Britain. Russia took 50 per cent of her imports from German sources, but "Made in Germany" will not recommend a product to the Allied Powers until the bitterness of this terrible conflict has passed. To what market will she therefore turn under the stimulus of her necessity? Why not here, with our vast consuming capacity, and South America, where she had greatly established herself?

There are natural laws of trade as certain as gravitation, and this is certain, other things equal, a nation of superior economic power and organization wins in the competition of peace as certainly as the nation of superior military organization and power in war. We can summarize the essentials of competitive success in trade as we find ourselves in possession of many elements. Huge stores of fuel and every form of power enrich our domain. The raw materials of manufacture, especially the basic metals, we possess in unequalled quantity. Our labor cost, whether in the extraction of raw material or its transformation for manufacture, is comparatively high.

### SKILL AND EFFICIENCY THE INDUSTRIAL NEED OF THE HOUR

High wages and low labor cost can go hand in hand, but high wages and low efficiency cannot. The \$5 man with three times the productive capacity of the \$2 man is cheaper labor at a higher wage. Our greatest industrial need in this hour is skill and efficiency. We must make the best operatives while making the best commodities. It is every employer's duty to encourage the training of skilled industrial soldiers to meet the assault of international competition. It is every worker's duty to become an efficient member of the army of industrial self-defense.

To attain this end we must have free play for capital and labor, unhampered by the unintelligent and uneconomic legislation, discouraging and cramping to private initiative, and liberty of development and opportunity for every workman to make the most of that which is in himself, that his personal improvement and advance-



ment, developing the best that is in him, shall at once secure reward commensurate with his ability and benefit by his service the society of which he is a part.

In Great Britain and the civil law countries of Europe business combinations have been allowed an ever-increasing liberty of co-operation and expansion. Here the tendency has been to contract the common law regulation with respect to business combination and enlarge and relax it with respect to labor combination. Industry and commerce are kept in a continuous state of readjustment to recent enactment, or with uncertainty and anxiety with respect to pending proposals.

#### INDUSTRIAL DEMANDS THROUGH STATUTORY ENFORCEMENT

Apart from its merits, the volume of new legislation is in itself a serious menace to progress. Some 20,000 new measures have been proposed in the present session of the national legislature and many thousands more in the State assemblies now in session. Their character exhibits the determination of powerful groups to secure the statutory enforcement of their industrial demands, thus permitting themselves the untrammelled exercise of their familiar but condemned weapons, the sympathetic strike and the boycott.

The American Federation of Labor has urged the introduction into every State legislature by the local

greatest industrial powers at war, are keenly studying the rehabilitation of industry and commerce. The Allies have given no little evidence of the formation behind their military mass of a great movement of trade conquest the moment their battle flags are furled. Let us not forget that we must face a competition in service and quality as well as price. We fear not the world in any contest of quality, but the market-places of mankind demand that we shall meet as well price and service.

I need not argue with you that by far the largest cost in production is the element of labor, and probably next to that the expense of distribution. In neither of these elements are we prepared to meet foreign competition. Despite shipping losses, if the war ended tomorrow England is still the carrying master of the world, and Germany would be a close second. We would still be compelled to rely upon them and to follow trade routes of their designation to compete in the best markets.

#### CAPACITY BUT NOT ABILITY TO COMPETE WITH THE WORLD

The conclusion of this great struggle finds us with the greatest consuming power of any nation in the world, with an equal if not a superior capacity to compete in the quality of our products but an inferior if

### The Skeleton, in Epigram, of Mr. Emery's Address

The Nation faces an economic war.

Europe's crowded nations must market what they do not consume.

Unless Europe fights herself into helpless exhaustion, we shall face the commercial challenge of desperate nations, trained hard and lean.

Germany has lost her greatest customer in Europe, but her industrial structure is intact.

The buying power of the United States is the greatest of the two hemispheres.

The renaissance of European industry and commerce demands here both public and private encouragement of efficiency.

It is no hour for watered capital or watered labor.

All history condemns the suggestion of State interference with hours.

The Seamen's act has terminated sixteen international treaties governing port and trade privileges.

The lesson of the hour is organization for the American employer.

State organization of an anti-injunction bill framed upon the lines of the statute adopted in 1914 in Massachusetts, the validity of which is now at issue in the courts of that State in the effort by one union to defend itself by injunction from the unlawful attacks of another. A comparison of the proposal with the Clayton act, which it pretends to follow in its more important sections, shows that the phrases conditioning the means to be employed, such as "lawful" and "peaceful," are left out.

Another vicious and reactionary proposal is embodied in the Tavenner bill, which undertakes to make it an offence punishable by fine and imprisonment for any officer of the United States to make any time study for the purpose of fixing a standard of service requirements or to pay any bonus, premium or cash reward to any Government employee. With the appeals of Lloyd George to the trade unionists of England still echoing in our ears, the submission of military defense to such restrictions involves a grave national peril. And the severe competition which inevitably faces us in the renaissance of European industry and commerce demands the public and private encouragement of efficiency of employer and operative as the first requisite of successful industrial self-defense.

#### EUROPE NOT FORGETTING THE ECONOMIC HEREAFTER

Every now and then we see through the smoke of European conflict the evidence that nations in battle have not forgotten the economic hereafter. The statesmanship of Europe is not only struggling to maintain the vast military organizations along its battle front, but Germany, France and Great Britain, the three

not uncertain ability to meet competition in price and service. Therefore have we not only to defend such foreign markets as we have temporarily gained, but to hold our domestic frontier against the invasion of efficient foreign competition, reinforced with low wage costs. Not only have women entered into industry abroad, but they have developed in the engineering trades a latent capacity declared by expert witnesses to be of an extraordinary character. Our own great Civil War taught men collective thought and action upon a vast scale that expressed itself in the most intensive and extensive industrial development of our history.

How shall we meet armies transformed into industrial organizations; unskilled labor raised to the zenith of capacity; women workers trained in large numbers to special dexterity and excellence, and management trained under the pressure of war and backed by a people drilled in self-sacrifice and self-denial? Are we to meet this with high wage costs, short hours and low efficiency, while they attack us armed with low wage costs, long hours and high efficiency? I sound no call for wage restrictions nor lengthened hours, but an appeal for employer and employee to face the future with clearness and understanding.

#### THE DEMAND FOR EFFICIENCY

There never was a time when so much could be paid for merit and excellence in industry. There never was a time when the capacity to pay will shrink so rapidly if organizations are to endeavor to substitute for the efficiency of the worker the coercive power of its numbers. The world contest of peace succeeding that of



war will be fought with trained men in shops and commerce, as the present vast conflict is being fought by trained men who, to win, must have behind them superior capacity in shop and office. It is no hour for watered capital or watered labor, but for management trained to the moment and operatives conscious that harmonious co-operation and intelligent self-interest can alone insure the joint industrial success of employer and employee.

Under these conditions you can well afford to raise wages to any level of increasing productive capacity, but you cannot shorten hours without making more difficult and more improbable your capacity to meet the economic readjustment that is as inevitable as peace. On every hand there is evidence that organized labor is turning to legislation to find aid in shortening hours through Government example. It realizes that there are both legal and economic limits to the attempt to fix hours in private employment, for if the State could do so and did, the Union would have nothing left to do; but it realizes also that the contracting of hours and the increasing of minimum wage in public employment exerts a continually increasing pressure upon private employment. You cannot have such reform without paying for it. Every increase in the cost of government increases the cost of living, and those who contribute most to the condition are generally most blind to their own contribution to the result.

#### WHAT HAPPENS WITH POLITICAL INTERFERENCE IN INDUSTRY

But the tendency is here toward the ever greater exercise of political influence to cause State interference with hours, directly or indirectly, influenced by the extensive belief that legislation can produce Utopia. All history condemns the suggestion. Guizot, in the maturity of his historic criticism, exclaimed, apropos of the overthrow of Louis Philippe:

There is no grosser delusion than the belief in the sovereign power of political machinery.

Spencer thought the remark wonderfully pat as he recalled the France that prompted it, and to which in part it still applies—a France of thousands of inspectors and prefects and sub-prefects, supervising, meddling with, controlling the private acts of people, their hours, occupation and conditions of employment, regulating not only railroads and canals and the multifarious intercourse between citizens and the departments of State, but a France which supervised the breeding of horses and sheep and regulated everything, from the construction of public works of France to the sanitary supervision of prostitutes. It directs art, subsidizes science, supervises amusements and censors literature, and monopolizes the conferring of honors and decorations. No wonder, in view of these things the people began to believe that legislation supplied the means of meeting all the difficulties, dissatisfactions and inequalities of life; but when they compared the accomplishments of Government with their aroused expectations, disorder followed discontent and revolution burst angrily from bitter disappointments.

The present seamen's act hangs about the neck of American shipping as the Old Man of the Sea clung to the shoulders of Sinbad the Sailor, strangling his power and handicapping his progress. We have by this unfortunate legislation not merely increased the cost of operating under the American flag to the point of discouraging private enterprise, but we have terminated sixteen international treaties. These relate not only to our marine relations but our arrangements with all the great powers of Europe, governing our equal opportunities for port and trade privileges and the very rights of our citizens and our consuls to enter the various courts of the European states upon an equality with their own subjects. We have abrogated the treaties at a time when the confused state of the world makes it impossible that we shall be able to make new treaties, if at all, without great disadvantage to ourselves.

American capital has met the exigencies of world disturbance with admirable skill and even undertaken to fortify the position which the war has made for us by trade combinations of an aggressive character, like the American International Corporation that is to carry

American investment into foreign fields. Bold and splendid as is that enterprise, the picture of Mexico must stare the business man in the face. Surely neither trade nor investment will ever vigorously pursue a foreign field until it possesses, by demonstration, the practical assurance that an American citizen, wherever he may go, he shall find beneath the folds of his own flag some part of that security that has made the British citizen in the darkest recesses of equatorial Africa safe and respected because his nation possessed the reputation of protecting her subjects under every circumstance.

#### WHAT THE EMPLOYER NEEDS TO DO

Legislation as a social cure-all for the inequalities of life, as a means of taking from the unpopular by popular vote, as a pleasing way of distributing the fruits of success to the unsuccessful, as a popular method of conducting social experiments at the expense of the frugal, the efficient and the well-to-do, has made persuasive appeals. The chief subject of attack, the business man, who cannot succeed without lifting others up, who makes two jobs grow where one grew before, has been, broadly speaking, the one unorganized element in a maelstrom of systematic, determined effort to control his action, restrict his operations, tax his earnings, discourage the reinvestment of his profit, if any he makes, deprive him of essential legal protection from powerful industrial organizations, and subvert and re-shape the vital character of his government.

The employer, carrying the chief financial burden of government and all the responsibility of supervising and directing commerce and industry, is the victim at every turn of organized effort. Timid public men, overawed by organization, have become by the very circumstances of the hour the persecutors of business because it is unorganized. Never was the stake so great. Motivated by justice and enlightened self-interest, the American employer can neither meet the abuses of organization except by counter organization, nor ascertain, compile or systematically arrange the complex facts of our industrial life, without organization. Without joining with his fellows, he can neither acquire nor express an articulate collective judgment than can rightly impress the makers and administrators of law. The lesson of the hour is organization for the American employer that he may with his fellows stand shoulder to shoulder in the defense of his rights and the study of and development of sound policies of business statesmanship to meet the serious circumstances of this day.

#### American Billets for Great Britain

The contribution of the United States to Great Britain's supply of steel billets, blooms and slabs since the war began is a striking illustration of the effect of the war on that group of steel products. The following table is compiled from the British official statistics:

Imports of Billets, Blooms and Slabs to Great Britain—  
Gross Tons

	Total	From the United States
August to December, 1914.....	27,939	9,342
Year, 1915.....	427,996	349,046
January and February, 1916....	25,455	21,330
Total to March 1, 1916, or 19 war months .....	481,390	379,718

The United States thus has furnished nearly 80 per cent of Great Britain's imports of semi-finished steel since the war started, whereas previous to the war the United States furnished less than 20 per cent of such imports and Germany nearly 80 per cent of the total. In the first two months of this year the United States furnished 84 per cent of the British imports of semi-finished steel.

Tin exports from the Federated Malay States for January and February, 1916, were 4316 tons and 3290 tons, respectively. This total of 7606 tons compares with 8175 tons and 8538 tons for the first two months of 1915 and 1914, respectively.

# The American Electrochemical Society

## Industrial Research and Preparedness, Ferro-alloys, Electric Furnaces and Corrosion of Steel Discussed at the Washington Meeting

In industrial research and industrial preparedness the work of the American Electrochemical Society and the varied industries it represents occupies a distinctly important place. These were the keynotes of the regular spring meeting of the society at the New Willard Hotel, Washington, April 27 to 29. The increased application of electricity to the steel industry and the growing number and importance of new alloys and of metals made electrochemically for use in steel making bring the society into closer relation with every year to the basic industry of the country.

The Washington meeting was largely attended, over 250 being registered, or more than at the New York meeting of April, 1914, then one of the largest in the organization's history. Symposiums on "Co-operation in Industrial Research" and on "Niagara Power and American Industries," as well as papers on the electric steel furnace, non-ferrous metals and the corrosion of steel were of direct interest to the steel industry, to say nothing of those dealing with practical electricity.

Lawrence Addicks, consulting engineer, New York, the retiring president, in opening the convention on Wednesday morning, April 27, made a telling presentment of the importance of the engineering profession to industrial and public interests. He said in part:

One of the results of the upheaval in social institutions which is in progress in one form or another throughout almost the entire civilized world, is going to be a changed attitude toward the engineering profession.

The great war has brought the engineer suddenly to the front, not only of the fighting line where he shares honors with the doctor and the nurse, but of the whole complex industrial organization back of this gigantic struggle, both of the countries at war and of those neutral nations undergoing a commercial upheaval. In the fighting zone it is called a mechanical and chemical war. At home our preparedness campaign is steadily assuming shape as an organized piece of engineering, carried on by engineers, which is as it should be, and further we have the very welcome sight of the several large engineering societies acting in harmonious co-operation.

The great question is whether the engineer will rise fully equal to his opportunity. When engineers are in agreement on a technical question affecting public interest, they should let their collective voice be heard. I believe that it is not only permissible but desirable that technical societies take an active part in legislative hearings, and offer suggestions or protests on public questions, provided only that the opinions advanced are really held by a reasonable majority of the membership, that the questions acted upon are reasonably relevant to the subjects covered by the societies' interests, and that a sharp distinction is drawn between matters of public interest and political campaigning.

In short, I submit that one of the first steps toward giving the engineering profession the place in public influence it deserves should be the vitalizing of the great engineering societies as living representative bodies of engineering opinion and the education of the public and the government to look to them for advice on engineering matters. The Naval Consulting Board is a most encouraging application of this idea and it is to be hoped that this policy will be extended to other departments of the government.

### Co-operation in Industrial Research

The important question of getting the most out of the work on research problems carried on by the university, the professional society, the Government and the corporation was the theme of a valuable symposium at one of the meetings. The professional society was represented by Lawrence Addicks and F. A. Lidbury, Oldbury Electrochemical Company, Niagara Falls, N. Y. The former regarded such a society a clearing house for ideas where technical or ethical matters in a profession's particular field may be discussed from an individual viewpoint. Unfortunately, papers before such a society usually deal with a successful or a completed research. The present situation offers three

unrelated factors: the practical worker in the field, the so-called theoretical worker in the university and the supposedly common meeting ground of the professional society.

The University was represented by Prof. W. D. Bancroft of Cornell University and by Prof. W. H. Walker of the Massachusetts Institute of Technology. Professor Bancroft stated that he believed very strongly in the desirability of an exchange of ideas between the teacher and the technical man. Professor Walker pointed out that whether co-operation between the university and industry be voluntary or compulsory, the result of such united effort is clearly demonstrated by the condition of industrial preparedness in which the nations of Europe found themselves at the outbreak of the present war.

It is only necessary to recall the fact that but for the co-operation of Haber and Oswald, of the university, with the manufacturers of nitric acid, Germany would long since have gone down in defeat. Selfishness is often a cause of lack of united effort. Our National Government is selfish in that it takes no part in promoting co-operation between the universities of this country and the industries. With the exception of agriculture it renders no aid to the university which enables it in turn to aid the manufacturer.

The corporation was represented by L. H. Baekeland, the Baelite Company, New York, and W. R. Whitney, director research laboratory, General Electric Company, Schenectady, N. Y., both of whom enlarged on the great work corporations carry on in scientific research. Mr. Baekeland said that it is easy enough to vote a credit for a research laboratory but the real difficulty is to locate the proper men who will use the appropriation to good advantage. That such a plan is possible and profitable is best illustrated by the well-organized research laboratory of the National Canners' Association, of Washington, presided over by Dr. W. D. Bigelow, a unique institution of the kind in the world.

Mr. Whitney stated that a large corporation can better afford to carry on extended research than a small one. An isolated iron foundry can hardly afford research on X-rays, magnetism and sanitation, but it may be benefited by any of these. The universities are so far out of touch with technical practice that they do not realize the needs of industry and not infrequently choose untimely researches or their discoveries fail to receive application where most needed.

The Government was championed by Dorsy A. Lyon, who dwelt particularly on the co-operative work which the Bureau of Mines is doing in conjunction with the University of Utah.

### THE DISCUSSION

The discussion of this subject was spirited and informative and participated in by Mr. Addicks, F. A. J. Fitzgerald, C. E. Skinner of the Westinghouse Electric & Mfg. Company; Dr. Carl Hering, Prof. Joseph W. Richards, Professor Bancroft, and others. Mr. Addicks felt that a lack of frankness was the cause of lack of co-operation in many cases; that ultra-practical men are too often found in charge of industries and are averse to universities. They should meet each other half way and the universities should step out and solve some practical problems.

Mr. Skinner, in a written discussion, showed that the matter of patents is often a barrier to co-operation; that there is enormous research in this country, but there is lack of co-ordination. He felt that Great Britain might point the way, as that country was planning a research corporation to bring about co-operation between industries and universities as well as an exchange of workers. The research of many universities was not practical, he said, and thought that



one remedy would be a request from them for thesis subjects from practical sources.

Prof. Richards, of Lehigh University, secretary of the society, considered the best co-operation by the university to be properly preparing men to solve problems, using the best methods for approaching practical questions, and grounding the students in fundamentals. The failure of technical schools consists in allowing men to tackle questions that are very complex and uneducative. The demand for men to-day from industrial companies needing problems solved is greater than the supply. Co-operation is necessary as well as the endowing of State university laboratories. F. C. Frary, Oldbury Electrochemical Company, insisted that industrial plants should more freely allow professors and students access to their works and acquaint them with their problems.

### Niagara Power and Industrial Preparedness

The symposium on "Niagara Falls Power and American Industries" was presented by I. R. Edmands, Union Carbide Company, Niagara Falls, N. Y., who dealt with "The Power Development"; by F. J. Tone, Carborundum Company, Niagara Falls, N. Y., who treated of "Electric Furnace Products"; by A. H. Hooker, Hooker Electrochemical Company, Niagara Falls, N. Y., who discussed "The Chemical Industries," and by W. S. Landis, American Cyanamid Company, New York, whose subject was "The Nitrogen Industry."

Mr. Edmands's paper was a plea for more power and an argument against the prejudice of injury to scenic beauty, showing how both objects could be attained with the added advantage to American industries. The importance of the electric furnace products to the steel and other industries was fully brought out by Mr. Tone, whose paper is printed in part on other pages.

The discussion of the symposium dealt chiefly with the need of more power from Niagara. F. A. Lidbury stated that the idea of the symposium was to emphasize the alarming situation and its extent and importance. The tendency at present is for certain industries to go to Canada for this power where its use is more favorably regarded by the government, and where steps are even now contemplated to curtail its exportation from Canada to the United States. As to California water power and others, the freight situation is the great drawback.

### NITRIC ACID AND BY-PRODUCT COKE

The nitric acid question came up in connection with Mr. Landis's paper, when the relative advantages of the cyanamid and ammonium sulphate industries as sources of ammonia were discussed. The ammonium sulphate phase was taken up by C. G. Atwater, of the Barrett Mfg. Company, New York, who stated that the production of this commodity is constantly on the increase and would amount to 376,000 tons per year when all the by-product coke plants are in operation. He felt that enough ammonia would be available for nitric acid from this source as against an expansion of the cyanamid process and at the same time sufficient benzol and toluol would be produced for explosives. The increased output of ammonium sulphate in 1916 would be 30,000 to 40,000 tons.

Combating this position, Mr. Landis called attention to the erratic production of coke dependent on the changed conditions in the steel industry from year to year, and stated that while at present the output of ammonium sulphate is 156,000 tons per year, with about 90,000 tons normally imported, 40 per cent of this is needed for refrigerating purposes and would be demanded in war time, leaving an insufficient amount for nitric acid.

Dr. John A. Mathews, president Halcomb Steel Company, Syracuse, N. Y., said, in connection with the Niagara power question, that 2600 kw. is being fed into Syracuse from Niagara for making electric steel and that about the same amount is about to be used at Lockport, N. Y., by the Simonds Mfg. Company. Most of the electric steel furnaces in the United States, he said, are not dependent on Niagara power. At present

over 100 such furnaces are installed or contracted for, which would probably produce, when in full operation, 750,000 to 1,000,000 tons of steel per year.

In reply to a question by Edwin F. Cone, New York, as to the manufacture of ferromanganese with Niagara power, or the making of manganese alloys from high manganese slags, Mr. Tone said that the only justification for making the ferromanganese had been high prices which would not obtain in normal times. As to manganese from slags, he knew of no experiments in that line.

### THE RENNERFELT ELECTRIC FURNACE

C. H. Vom Baur, of Hamilton & Hansell, New York, agents for the Rennerfelt electric furnace, presented an abstract of his paper, printed elsewhere in this issue of THE IRON AGE, and threw on the screen some slides illustrative of European installations.

To various questions asked by N. Petinot of the Titanium Alloy Mfg. Company, New York, Mr. Vom Baur replied that in visiting various installations of this furnace in Germany he had been impressed with the manner in which the arc plays over the bath and that experience had shown that, using a magnesite roof, the average cost for refractories is 70c. to 80c. per ton for the Rennerfelt furnace, against \$2.30 to \$2.40 for the Stassano. While a silica roof was found practical and while the 12-in. brick soon wasted to 9 in., magnesite brick lasts longer.

As to electrode consumption, Mr. Vom Baur said that for steel castings it amounted to about 4 lb. per ton, using graphite electrodes, and about 6 lb. per ton for tool steel from cold scrap. The advantage of one door was emphasized by Mr. Vom Baur, in reply to a question, in that it was constructed large enough to enable a satisfactory survey of the bath and furnace and cut down the loss of heat and energy believed to be due to more than one door.

Professor Richards said that the need to-day of the steel industry is a 40-ton furnace and that the Rennerfelt seems especially adapted to this need.

### The Corrosion of Iron and Steel

The corrosion of iron and steel took up a portion of one evening session over which Dr. Allerton Cushman, Washington, presided. Two papers on this subject were presented, one by Prof. W. H. Walker, on "Corrosion and the Engineer," and the other by J. Aston, U. S. Bureau of Mines, Pittsburgh, on the "Effect of Rust upon the Corrosion of Iron and Steel." Mr. Aston's paper emphasized the role which rust, once formed, plays in its effect on the progression of rusting. He said:

Whether we fall back on the acid or electrolytic theory of rust formation, we grant it will form; for formation under the most unfavorable conditions is what each faction claims to prove. Once formed, what part does it play in subsequent reactions? As a result of much observation and study of the characteristics of rust, the following conclusions are advanced:

1. Rust plays a role in the electrochemical relations at least equal to that of constituents usually assumed to be highly detrimental.
2. Very probably in all cases, but almost certainly when rust is freshly formed, its influence is not as an electrode, but as a coating which affects the polarity of the underlying iron.
3. Rust plays a dual role; the underlying iron may be anodic or cathodic to bare iron, depending upon the state of hydration. But fresh wet rust makes this iron electro-positive.
4. Rust is an accelerator of further rusting.

Professor Walker's paper had to do largely with the corrosion of underground structures. He said:

Eight years ago it was my privilege to present before this Society a paper on the function of oxygen in the corrosion of iron, in which I offered an explanation for the galvanic action of such inert bodies and made some applications of the facts described to general engineering practice. Time has shown that the conclusions there drawn were correct. . . . Corrosion is an electrolytic phenomenon and can



be understood by electrical engineers on purely electrochemical grounds. If oxygen be completely removed from boiler feed-water, the boilers will not pit or corrode. If oxygen is separated from the feed water or ordinary hot water supply lines, the 'red-water plague' and other corrosion troubles will disappear. . . . If electrical and mechanical engineers will only take more closely into their confidence their brother electrochemists, we can together more quickly make available the knowledge on the subject of corrosion already at our command for the elimination of the difficulties which corrosion introduces into commercial practice.

#### THE DISCUSSION

In discussing corrosion, F. N. Speller, National Tube Company, Pittsburgh, said that the company's research laboratory is engaged on this subject with special references to pipe; that the introduction of steel pipe had added 50 per cent to the life of pipe as against iron pipe, and that the removal of oxygen was instrumental in adding to it further. He believed that it matters little as to what iron pipe is made of; it is oxygen that makes the difference, but only under water conditions and not in air. Mr. Aston's remarks as to rust agree with what occurs in pipe and fresh rust produces more effect than dry rust.

The chairman, Dr. Cushman, made an impressive statement of his position. Corrosion is going on everywhere, and it is a complex and very important question, involving the lives of men in battleships and submarines. He admitted he did not know how to stop it.

Progress has been made in refining metals and poor stuff no longer is accepted. We want sound metals so as not to have "gas sandwiches"—metal rolled down with blow holes in it. Let us help each other and not quarrel. I will quarrel no longer with anyone on this subject. I agree that corrosion is an electrochemical phenomenon and I agree with Mr. Speller on the elimination of oxygen in pipe lines, but there are many failures that are unexplainable and there is no subject so complex.

Prof. G. A. Roush, of Lehigh University, South Bethlehem, Pa., said that in going over some old books in a garret recently he came upon one of a cyclopedic nature in which he accidentally found the statement that copper added in iron in small quantities tended to prevent corrosion. Dr. Cushman, after saying he had hoped the copper question would not come up, observed that he also had found in years gone by samples and analyses of rusted material which also had copper in them.

#### MAGNESIUM AND COPPER

Dr. W. M. Grosvenor's paper on "Magnesium" presented at a recent meeting of the New York section of the society and printed in THE IRON AGE, Feb. 17, 1916, was called up for discussion at one of the sessions. Asked whether there was any danger from ignition when using the metal industrially as in aviation, Professor Roush replied that magnesium is usually alloyed but that it is ordinarily a good conductor of heat. Attempts to ignite a fair sized stick have been unsuccessful, the heat being conducted as in other metals. In the ribbon or powdered state, conditions are naturally different.

The paper on "Brittleness of Annealed Copper," by W. E. Ruder of the research laboratory of the General Electric Company, Schenectady, N. Y., was presented in abstract by the author. Summarizing his results, he said:

The brittleness of copper developed during heating in the process of manufacture and frequently ascribed to "burning," is in reality a deoxidation. With ordinary commercial copper, serious brittleness begins to appear at 400 deg. C. in dry hydrogen, at 600 deg. C. in wet hydrogen, at about 800 to 850 deg. C. in CO, and at 700 deg. C. in steam. Copper which had previously been deoxidized by the addition of boron remains unaffected at all temperatures in a reducing atmosphere. This brittleness is therefore due to the reduction of the cuprous oxide around the primary copper grains, leaving a spongy mass of little mechanical strength, and not to any direct action of the hydrogen upon the copper itself.

#### At the Bureau of Standards

The session of Saturday morning was held in the auditorium of the electrical building of the U. S. Bureau of Standards in the outskirts of Washington. President

Addicks introduced Director S. W. Stratton of the Bureau as the man who had done so much for Government research. Mr. Stratton spoke briefly on the work of professional societies, of their fostering of good business relations and of their fairness and great care. The tendency to bring the societies closer together he commended, noting that there had been too much of a breach between physics and chemistry, which this society is doing so much to close. Future progress, he believed, depends on success on these lines. Signs of the times are recent visits, for consultation with the bureau, of committees of the civil engineers, the cement manufacturers, the American Institute of Metals and the American Physical Society.

#### CENTIGRADE FOR FAHRENHEIT SCALE

Dr. Carl Hering presented a resolution indorsing a bill now in Congress that in all Government publications the centigrade scale should ultimately be substituted for the Fahrenheit, probably at the end of four or five years; in the meantime the two to be used side by side. It was stated that out of 2300 letters sent out, 97 per cent of the replies were favorable. Professor Richards stated that already it was the custom of the society to print only the centigrade scale. The resolution, after a brief discussion, was adopted unanimously.

#### ELECTROLYTIC ZINC AND IRON

Professor Richards presented an abstract of what W. R. Ingalls, editor of the *Engineering and Mining Journal*, had prepared on "Electrolytic Zinc"—a review of the industry and a discussion of its future. In the discussion Mr. Addicks expressed the belief that electrolytic zinc has come to stay and to expand, despite unknown conditions after the war, while Dr. Hering said that western ores, that had been previously penalized because of their zinc contents and were waste products, are now being worked for zinc. Professor Richards considered that the day of electrolytic zinc had come and that it is to be a large factor in commercial zinc production. He thought the problem had been solved.

"A Review of Recent Progress in Electrolytic Iron," by Oliver W. Storey of the C. F. Burgess Laboratories, Madison, Wis., was abstracted by F. A. Lidbury. The paper discusses the various processes and uses as well as the effect of addition agents upon the deposition of iron. A detailed estimate of cost, based on production on a large scale, was furnished by C. F. Burgess. This cost is given as \$10.75 per ton on a refined output of 8640 tons for 360 days.

The brief discussion brought from Mr. Addicks the opinion that there was very little immediate future for electrolytic iron, but if the process could be applied to iron ores it would be highly desirable. Professor Richards raised the question whether electrolytic iron is not being produced in the Pittsburgh district from pickling liquors, but no member could offer any detailed data.

#### ELECTION OF OFFICERS

Francis A. J. Fitzgerald of the Fitzgerald Laboratories, Niagara Falls, N. Y., was elected president of the society for the ensuing year. Dr. Joseph W. Richards of Lehigh University, South Bethlehem, Pa., was re-elected secretary. The vice-presidents selected were C. G. Schluederberg, F. J. Tone and Prof. W. H. Walker, and Prof. W. D. Bancroft, Dr. Carl Hering and E. F. Roeber were made managers.

Features of the convention were a trip to Mount Vernon, where a large group of the members were photographed, an inspection of the various laboratories of the U. S. Bureau of Standards and a visit to the Geo-Physical Laboratory.

#### Massachusetts Compensation Rates

After being held up for six weeks by the protest of a large delegation of manufacturers, the new schedule of rates for workmen's insurance was put into effect in Massachusetts on May 1. Foundry owners are the hardest hit, their rates being doubled. A few of the new rates on each \$100 of annual payroll are: Automobile manufacturing, 74c.; drop forging, \$1.51; foundries, ranging from \$1.11 to \$2.41; motor-cycles and parts, \$1.07; small arms, 60c.

### Bench Machine for Forming Eyelets

A forming machine for making eyelets and other special shapes in wire is being placed on the market by the Great Western Spring Support Company, 3904 Superior Avenue, N. E., Cleveland, Ohio. In operating this machine the wire is placed in an adjustable slot guide between two pins, extending between them far enough so that the shorter of the two will catch the end of the wire.

The handle connected with the revolving head, which has previously been set at a 90-deg. angle, if an eyelet is to be formed, is turned to the left and the wire is bent in shape. Then the handle is reversed until it strikes a lug on the opposite side, this operation bringing the center of the eyelet in line with the wire. The machine is adjusted for the different sizes of wire by a screw on the slot guide and a thumb screw which holds the center pin in place. The short pin is held in place by a headless set screw which is adjusted in the slot on the face of the revolving head. It also has a reciprocating movement, being operated by turning the screw on the outer surface of the head which works in a dovetail adjustable plate. This pin is adjusted to the size of the wire. The figures on the face plate show the length of the wire to be formed and those on the degree dial give the different angles.

In addition to eyelets the machine can be used for forming staples, hooks, brackets, door latches, braces, tool racks, figures, letters and artistic designs. It is



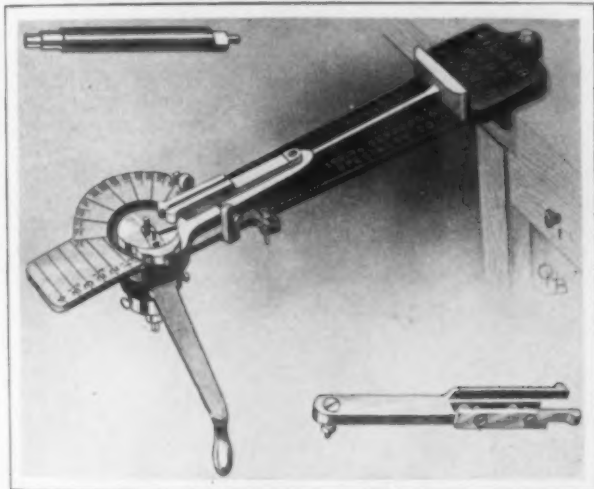
An All-Steel Industrial Truck Capable of Lifting Loads of 2500 to 5500 Lb. from 2½ to 3 Ft.

which does away with the probability of leakage at the piston end or the buckling of the plunger. All parts are of metal, thus eliminating the necessity for changing leather cup packings.

### A Cross-Head Guided Expansion Joint

The Ross Heater & Mfg. Company, Inc., Buffalo, N. Y., has developed a new type of expansion joint. The mechanical principle upon which it operates is similar to that of the piston rod, stuffing box, cross-head and guides of an ordinary steam engine. The joint is made in standard sizes for all pressures up to 200 lb. per square inch and for pipe up to a maximum diameter of 24 in.

The main casting is divided into two parts for accessibility, the two portions being connected by heavy flanges and bolts. The guide and the body are heavily ribbed, which tends to make the entire joint strong and rigid. The expansion or moving element consists of a long sleeve made steam tight by a long stuffing box and gland. The sleeve, which is made in two lengths having a total free travel of 4 and 8 in. respectively, is supported at the outer end by companion flanges which slide freely in the guide, the surfaces in contact being carefully machined with a view to securing perfect alignment. It is this cross-head principle that is relied upon to keep the sleeve in alignment and relieve the line from stress both when hot and cold. Tie bolts are employed to keep the cross-head from being drawn out of the casing and the joint thus drawn apart. The amount of traverse available minimizes the number of joints required in a pipe line, and the maximum diameter of the joint is but little larger than the ordinary pipe line, it is pointed out. The joint thus takes up but little more space than the straight pipe line itself and it is



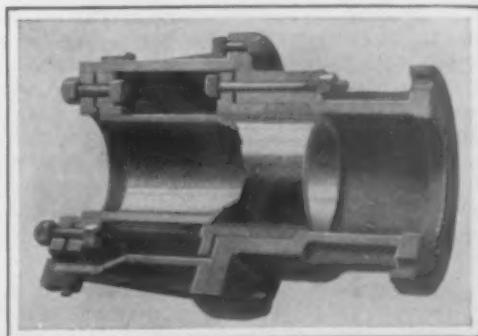
A Recent Bench Machine for Forming Eyelets and Other Special Wire Shapes

adjustable to four sizes of eyelets up to ½ in. Its operation is simple and rapid, and it is stated a boy can form from 6000 to 10,000 eyelets per day. The machine is 18 in. in length and when in use is placed in a vise or fastened to a bench.

### A High-Lift Elevating Industrial Truck

An elevating truck for use with sets of platforms for transporting goods in industrial establishments has been brought out by the Lewis-Shepard Company, 262 Dover Street, Boston, Mass. It is of all-steel construction except the wheels which are gray-iron castings, the frame being built of steel angles, and the load is lifted vertically by a combination of leverages secured by from four to six short strokes of the handle. The load may also be lifted in any position since the use of a universal joint secures a free lifting and steering handle. The feature of this arrangement upon which emphasis is placed is that the blocking up of the aisle when lifting the load is avoided. It is stated that only about 7 per cent of the power applied to the handle is consumed in overcoming friction, thus making it possible to lift 3000 lb. with a pull of only 85 lb. in four short strokes, or 5500 lb. with a 110-lb. pull in six strokes.

The load is lowered to the floor by a release check, which is controlled by a pedal located on the front of the truck. This check is placed in a vertical position



An Expansion Joint for Pipe Lines Embodying Mechanical Principles Similar to Those of the Steam Engine Piston Rod, Stuffing Box, Cross-Head and Guides

possible to cover it with ordinary insulating material easily. This feature, together with the small number of joints, effects a saving in the amount of space occupied.

By removing the bolts on the guide flange and sliding off the guide casing, the stuffing box is rendered accessible. The packing space of the stuffing box is long and can be packed with any kind of metallic or fibrous packing, thus giving a steam tight joint, which it is emphasized requires practically no attention. If it should become necessary to draw up the packing gland, it is explained that this can be done from the outside without disturbing any part of the fitting.

Where the joint is to be used with pressures under

150 lb., all parts with the exception of the sleeve are made of semi-steel and cast steel is used for the higher pressures. It is explained that since the inner area of the slipping section is equal to the area of the pipe, the parts move freely and a perfect balance is secured in the joint which relieves the stresses that would otherwise be brought to bear on the flanges and fittings. Where excessive movement has to be taken care of a combination of two or more joints with standard tees and fittings are recommended. Anchorage footings are cast on the joints intended for use at all points in the lines where elbows or tees for branch lines are located, or where support is required to carry the weight of vertical pipes and fittings.

## Status of American By-Product Coke\*

### Growth of the Industry and the Obstacles Surmounted—The Question of Brick—Surplus Gas and the Recovery of Benzol

—BY THOMAS C. CLARKE†

The number of beehive ovens in operative condition in the United States in 1894 was about 30,000, as against about 40 by-product ovens. The high water mark in beehive ovens was in 1910, the total then being a little over 100,000. To-day the number of beehive ovens is reduced to about 95,000, whereas the by-product ovens total 8677, with over 1000 of that number under construction.

#### EARLY CONSTRUCTION AND CONDITIONS

Ovens as built here originally were from German plans and specifications and no consideration was given to the difference in the coking quality and analysis of the coals. In fact, beyond sending a few samples of coal to be coked in Germany, no attention was paid to the existing conditions, and the attempt was made to make coals adapt themselves to the ovens, rather than the ovens to the coals.

Those, like myself, who were fortunate enough to be in charge of by-product coke ovens at that time were impressed by the usual economic differences between foreign and American practice. Cheap labor permitted the German practice of from 28 to 36 hours' coking time with a 4 to 5-ton capacity oven, but American conditions all pointed to greater economy, if the coking time could be reduced and the capacity increased. But to do that obviously required the entire redesigning of the ovens.

In the period from 1900 to 1906, tentative experiments were made but nothing was accomplished, although well-defined theories were evolved that have since helped during the reconstructive period.

I shudder to think of some of the costly repairs that became necessary, due to our misguided zeal in trying to improve the coking time. We melted regenerators and walls in pursuit of scientific data. With the assistance of stack drafts and exhausters, we tried experiments with flues and gas burners designed for 24 hours' operation, and managed to cut the time down, but our by-product yields were unrecognizable. The owners of the ovens suffered, but I think the results attained show that their suffering was not in vain.

To increase the size of the oven charge required a larger oven, which in turn required more heat, and more heat demanded increased flue and gas area. The ramifications of this change are not only the larger ovens and methods of heating them, but increased size of off-take mains, cooling and recovery apparatus—pushers, quenching cars, coal and coke handling plants, mixing bins, etc.

This is the problem that confronted the engineers in the coke-oven business. To their credit be it said, they

overcame the difficulties arising from such a complete change, they did it with very few mistakes, and what they did, they did well.

About the time that this was being done, a new factor which was a tremendous influence for good appeared in the appointment by the United States Steel Corporation of a committee to investigate the by-product coke industry. This committee went to Europe, and their investigation was of the greatest value to the industry here. With minds trained to mechanical refinements, they saw that the larger oven was perfectly feasible and they selected for their first plant the Koppers type. This was seven years ago and one battery then built has never been out of operation and is in first-class physical condition to-day.

#### THE QUESTION OF BRICK

In only one respect did they allow existing prejudices to influence them, and that was in the matter of the brick. In European practice the quartzite brick is universally used. The silica brick is standard in this country. It is more efficient in conductivity and the only problem it presented at the beginning was its expansion under high heats. Perhaps the difficulties of that will appeal more strongly to you when I say that in the modern oven the bricks for one oven weigh about 129 tons, of this tonnage, 15 tons are silica 9 in.; 45 tons, silica shapes; 52 tons 9-in. clay and 17 tons clay shapes, or 60 tons of silica and 69 tons of clay in all. While all of this brick is not silica by any means, yet the allowances for expansion in a battery of 75 ovens present rather nice calculations.

There is one other feature that delayed the general adoption of the by-product oven in this country, and for that we must blame our bankers. In Europe we know that the chemical and its allied industries are looked upon as very attractive investments, while here our bankers are, or perhaps since the war began, I should say were, very slow to take up this kind of investment, but I think that we may safely say that to-day a different feeling exists among them.

#### THE METALLURGICAL PHASE

The metallurgical aspect of the situation brings conservation to our attention again. It was the habit of the coke producers of this country to put ovens as near the mines as possible and the coal which was used was unmixed and while during bad times it might have been a very good coke, during good times almost anything was shipped and accepted.

A by-product coke oven, located usually near the blast furnaces, solved a great problem for the steel makers. Coals were brought to the ovens and mixed. At first it was thought a fairly high volatile coal would not make metallurgical coke, and various mixtures of

\*From an address before the New York Section of the Society of Chemical Industry, April 21.

†Consulting engineer, New York.



high and low volatile were made, depending on the individual's experience and convictions. To-day, however, a volatile of 30 per cent and over is being made into excellent metallurgical coke in a number of places.

The mixing of the coals developed the fact that even an inferior coke, if it was absolutely uniform, would show a fuel saving in the blast furnace. It was common practice to put in coke from perhaps two or three different operations. While the coke physically looked about the same, it could not, as a matter of fact, be counted on to be uniform, and in consequence the furnace was operating under varying conditions, a hard coke going in at one time and a soft coke at another. This obviously does not tend toward fuel economy. The charging of large and small pieces of beehive coke was usual, whereas to-day it is recognized that by crushing the coke to uniform size, while it increases the amount of breeze, thereby lowering the yield, works wonders in a blast furnace.

#### ASH AS A SOURCE OF ECONOMY

A second source of economy in furnace practice equally important is the ash. In a 400-ton furnace 1 per cent of ash in the coke, using a fuel consumption of pound for pound, would mean putting in the furnace 4 tons per day of a material costing \$4 a ton, which not only is not valuable but is positively detrimental. To flux this ash, stone must be added, and to melt the ash and the stone more coke must be added, then to flux and melt the ash in the added fuel the same cycle occurs, until the negligible point is reached. This gives an idea of what may be saved by the elimination of ash and the substitution of carbon in its place in the fuel. In this item alone selecting coal for its ash content justifies the added cost of better selection at the mines, cleaner mining, etc.

Uniformity enters prominently into the calculations for with uniform by-product coke the furnace man burdens his furnace for a regular ash and sulphur content.

In the Chicago district the coke consumption per ton of pig iron has dropped from the old ratio of 2240 lb. of coke to 2240 lb. of pig iron to 1800 lb. per ton of pig, and I was informed two weeks ago when in Chicago that some furnaces there were running under 1700 lb. On a production in the United States of 30,000,000 tons of pig per year, a saving of 400 or 500 lb. of fuel per ton of pig, with the fuel costing in the neighborhood of \$4 per ton, is conservation of coal and of money, and again shows what a great debt of gratitude we owe to the pioneers in this industry.

As uniformity is the keynote to good practice in a blast furnace, so is regularity to the by-product coke oven. The practice to-day is to run everything on schedule and to make the heats conform to that schedule. Of course, this is only possible now that the regulation of nozzles, dampers, gas and air, have been refined.

It was early seen that any coke oven that could be properly heated would make coke, so the competition lay in skill in design. Simplicity was the keynote and the design had to provide for easy access to all parts.

#### THE SURPLUS GAS AVAILABLE

In years gone by the amount of surplus gas available was guaranteed by the oven builders to be 5000 cu. ft. of gas per ton of coal coked of a B.t.u. value of 500 per cu. ft. When in Chicago the other day I visited a plant that has been in constant operation 27 months, where the yield of surplus gas was 6250 cu. ft. and the B.t.u. value 590. I am credibly informed there is one plant where the surplus gas runs to 6600 cu. ft. This marked improvement, of course, is only possible where the air is absolutely excluded, as leaks would prevent any such results. This condition reflects the highest credit on the oven designers who have made such allowances for the expansion of the materials employed in construction that they can get such results.

The oven size has gone from a capacity of 4.5 tons to 13.5 tons of coal; at the present time this seems to be about the standard, although some of the engineers are now advocating 12.5 ton ovens. While it varies with different coals, an oven is generally about 17 in. to 22 in.

wide, with a taper; this being necessary to facilitate pushing the coke. The height of the oven is about 10 ft. and the length from 35 to 40 ft.

The cost of the oven has increased from about \$7,500 per oven to nearly \$20,000 per oven. This, while seemingly excessive, is easily explained by the increased weight of all the materials entering into the construction of the ovens and their accessories and the fact that for this amount of money the maintenance and conversion cost has been cut to well below 60c. per ton of coal coked. Taking as an example coal around 28.5 per cent volatile matter, with the ordinary yields a typical balance sheet for a 100-oven plant of 13.5 tons per oven capacity on an 18-hr. coking time would be as follows:

Daily Expenditure	
1766 tons of coal at \$3 per ton.....	\$5,298.00
Conversion cost, including depreciation, contingencies and charges of every character except interest and administration, 60c. per ton.....	1,059.60
Interest on investment of \$2,000,000 at 5 per cent. \$100,000 =	
22c. per ton of coke, 1236 × 22.....	271.92
	\$6,629.52
Receipts	
Tar, 7 gal. per ton of coal, at 2½c. per gal.....	\$309.05
Sulphate, 1 per cent at \$60 a ton.....	1,059.60
Gas, 6000 cu. ft. at 10c. per cu. ft.....	1,059.60
Benzol, 2¼ gal. at 14c. or 20c., less 6c. conversion.....	556.29
Toluol, 0.3 of a gal. at 15c. per gallon.....	79.47
	\$3,064.01

This makes the cost of coke \$6,629.52 — \$3,064.01 = \$3,565.51 for 1236 net tons coke, being a yield of 70 per cent, or \$2.88 per ton. So you have a ton of coke for less than the ton of coal cost you, and have 10,500,000 cu. ft. of available surplus gas of 550 B.t.u. value at 10c. per 1000 cu. ft. and a uniform coke both physically and chemically, with depreciation and interest taken care of.

At present war prices the fortunate owners of by-product coke ovens selling their benzol at 0.50c. per gallon and their toluol at \$4.50 per gallon, find their coke costs them nothing and they earn about \$4.50 per day besides. Free blast furnace fuel makes for low costs and increases earnings.

When changing from 24-hr. coking time the tendency was to reduce the time as low as possible (and coke was successfully made under 16 hr.), but the high heats employed made this practice most dangerous, for neglect at any time would melt the oven. So gradually the heats were brought back until a time was reached which the consensus of opinion deemed to be economically balanced. This time was 18 hr., and the ovens after running for long periods on these heats show no signs of deterioration.

(To be concluded)

#### Italian Benzol Recovery Ordered

The compulsory extraction of benzol from all coal gas in Italy for military purposes has been ordered by recent regulations issued by the government, says the *London Iron and Coal Trades Review*. Works making more than 35,000,000 cu. ft. of gas are to put in a plant at their own expense; those making less are to receive a subsidy of 8s. (\$1.95) per 350,000 cu. ft. of gas made. The amount of benzol, toluol and xylol to be extracted is limited to 15 to 20 oz. per 1000 cu. ft., or such an amount as will not reduce the heating value below 517 B.t.u. per cubic foot or the lighting value to less than two-thirds. This is subject to orders issued by the munitions department. The benzol produced must be 55 per cent, with a tolerance of 5.5 per cent either way; payment will be on a 55 per cent basis. Plants unable to distill their own oil may have this done for them. The munitions department may advance one-third of the necessary capital, which will be set off against the price of the oil supplied. All works which distill coal, whether gas works or not, must report the amount of tar they make and all tar-distilling plants must be reported to the authorities.

Swedish shipbuilding yards in 1915 launched 21 steamers, aggregating 26,351 gross tons, according to *Nautisk Tidskrift*. The total also included 17 motor vessels of 4900 tons and 12 sailing vessels.

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# THE IRON AGE

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## Storing Up Labor Trouble

The labor troubles of 1916 in the iron and steel and metal-working industries are as extraordinary as are the conditions affecting the demand for the products of those industries. From its beginning the year has been dedicated to strikes, and every forecast of iron and steel markets has turned on the extent to which wage and other labor demands would interrupt production. In the Youngstown, Ohio, district the year came in with strikes at blast furnaces and steel works and with rioting that destroyed lives and property. In the Pittsburgh district May has brought mobs and deadly conflict at one steel plant. The war spirit has risen as the year has advanced and plant managers have had to face constantly the possibility that any day's demands would put an end to operations.

There has been no disputing the claims of workers to a share in the unusual prosperity that set in in the late summer of last year. Wages have been advanced repeatedly. The war has made food and other commodities higher; that has been one of the ostensible reasons. But in the main it has been with labor as with steel—a demand greater than the supply, and a demand never so imperative. Two advances and in many cases three have been made since the early fall of 1915 to blast furnace and steel works labor. The Steel Corporation's two 10 per cent advances—one effective on Feb. 1 and the other on May 1—have been widely published, but at a good many plants as much has been done—more at some—but with less publicity. What the Steel Corporation does can never be kept in a corner.

There has been no concealment of the unparalleled scale of profits in iron, steel and machinery manufacture. Never in this generation has steel brought such prices. Fearful at first of the consequences, steel makers were disposed to put limits to price advances; but they are now well beyond all that feeling. Since no such opportunity will come again, they must make the most of it. That is just the attitude of the workers. Labor is in demand as never before, therefore it must get all it can.

The trouble is that that is not a full statement of the labor position. As though all this prosperity could be taken in hand and made to do duty ever after, labor union leaders have set out to get control of the shop, believing employers will not dare risk shutdowns when earnings are so remark-

able. But the other side of that statement is the fact that many employers are now so fortified by months of good earnings that they are more ready to stand against unreasonable demands than they were a year ago. It is plainly a situation in which there will be little reasoning together and settling by give and take. It is a case of let him take who can—as near to a war basis as American industry has ever come. There is, to be sure, a form of conference or of arbitration in the major disputes, as of coal miners and railroad men; but the outcome is much the same.

It need not be argued that there is a reckoning for all this. What has been taken by sheer force will be yielded up to the same kind of argument. The "victories" for the eight-hour day will be followed in time by conditions in which employees will be eager to get nine-hour jobs. So far as the closed shop is concerned, the employers in the metal-working trades are strong enough in the main to ward off that calamity. They are willing to share special prosperity with their employees, but not to bind on to their business conditions which cannot be shaken off when war profits disappear.

The simple truth is that the country's manufacturers and workers in lines which have to do with munitions contracts, while seeming to be prosperous, are storing up untold trouble. The war has as really set them at variance in many cases as it has set the actual belligerents, and there are as certainly ahead of them years of painful readjustments.

## Caring for Consumers

Probably more than in any other branch of business, iron and steel manufacturers have long observed the policy of caring for the interests of their customers. Contracts have been drawn on easy terms. Consumers have practically been granted options invariably capable of favorable construction in their behalf. Such leeway has been allowed on contracts that consumers have been permitted to take minimum quantities with delivery dates extended when prices have receded, and on the other hand have been graciously given the opportunity to take maximum quantities on shortened deliveries when prices have advanced. In numerous instances the iron and steel manufacturers have been known to readjust contract terms in



a period of falling prices, giving their customers the advantage of the lower market instead of endeavoring to enforce rigidly the original contract terms. It is true that frequent efforts have been made to bring about a change in such practices and thus to make contracts in the iron and steel trade of binding force like contracts in other branches of business, but such efforts have not been successful up to this time. The history of the trade is therefore one of tender regard for the good-will of consumers.

To such an extent was this scrupulous care for the interests of consumers carried that after the formation of the United States Steel Corporation the leading steel manufacturers co-operated with that company in an endeavor to keep prices from advancing beyond what was considered a reasonable point in times of great activity. This was done for the purpose of bringing about a better feeling among consumers who, it was hoped, would be impressed by this disposition of the manufacturers to forego what might be considered exorbitant profits and thus be less disposed to demand lower and still lower prices in periods of depression. It is a matter of history that this attempt to establish better relations between sellers and buyers proved fruitless. Consumers of iron and steel were as relentless as ever in efforts to force manufacturers' prices lower in the periods of depression which have disturbed the trade since then. The present era of prices "going through the roof" appears to be the inevitable result of the fruitless effort to bring about a better consideration of manufacturers' interests by consumers. A day of price readjustment is sure to come, perhaps in months or perhaps in years, but in the meantime iron and steel manufacturers are reaping a profit which will enable them to fortify themselves against the days when competition for business will become fierce and prices drop to an unremunerative point.

Not all of the manufacturers of finished steel products are securing what they should from the present abnormal demand. An important exception is the tin-plate trade. It is apparent now that the manufacturers of tin plate have sacrificed large profits by having taken last fall contracts for this year's requirements from tin-plate consumers. The prices named on those contracts represented such an advance on the contracts of the same character placed a year before that the tin-plate manufacturers for a short time probably felt quite satisfied with what they had done. They now see that this policy was a mistake. The contract price is far below the price now easily obtained. The tin-plate trade is possibly reaping as a whole several million dollars less profit than would have been secured if contracts had been limited to delivery in three or four months, or had been arranged on a sliding scale with sheet bars as the basis of monthly settlements. Here again, however, has the consideration of manufacturers for their customers manifested itself. A flat price was written in these contracts and this price is rigidly adhered to. It may be assumed that, if conditions this year had so changed that semi-finished steel would have grown plentiful and prices of tin plate had fallen, the consumers holding these contracts would have taken minimum

quantities of tin plate and possibly insisted on a readjustment of prices.

Complaints are insistent from numerous consumers in other branches of the trade who feel aggrieved because their wants appear to receive scant consideration from steel manufacturers. Some of these complaints take the shape of regarding the attention paid by manufacturers to the export trade as outrageous when domestic buyers are unable to have their requirements promptly filled. These buyers, who are also manufacturers, would probably be very glad to have the same opportunity, and would eagerly embrace it, to furnish their products to foreigners at higher prices than are being obtained in domestic markets. It is possible that many of them refused to take warning from the first rush of foreign buying, when they should have either stocked up for their future wants or have protected themselves by contracts for their requirements. It must be considered that they only have themselves to blame for their lack of foresight, and not the steel manufacturers, who are obviously entitled to get the very best results possible from the present extraordinary condition of the steel trade of the world.

### The Proportion of Export Steel

Considerable interest is manifested in the question how much of the steel we are producing is being exported. Mr. Schwab's statement last week at the annual dinner of the American Newspaper Publishers' Association in New York is not illuminating. In speaking of the belief of many people that "the recent great production of iron and steel is due to the war," he said: "It may surprise you to know that less than 10 per cent of the steel manufactured in the United States has been used outside the United States." This is somewhat cryptic. Our steel exports have been important only in relatively recent years, and possibly of the total production to date no more than about 10 per cent has been exported. Again, the word "used" might be susceptible of different interpretations, as there is steel used in American machine shops and automobile factories, although the finished product is used abroad. Again, we "make" a much larger tonnage of steel, measured by ingots, than we make of commercial steel, in rolled forms, for sale, by reason of there being produced in the rolling process scrap which goes to the open-hearth furnace to be weighed a second time as ingots, and scale which goes to the blast furnace to be weighed a second time as pig iron. As the ultimate consumer does not use ingots, comparisons of exports are properly made with finished rolled steel.

Steel involved in exports is of two classes, there being exports of rolled and other forms of "finished" steel exported direct, and exports of manufactures in which steel has been used. The former are reported by weight, while the manufactures are reported by value, and occasionally, as with automobiles and cream separators, by number.

The exports reported in tons have been quite uniform in the eight months July to February. The largest amount in a month was 406,000 gross tons, in August, and the smallest 351,000 tons, in October. The total in the eight months was 2,-



963,855 gross tons, as shown by the detailed statement in THE IRON AGE of April 20, page 948. One-eighth of this is 370,000 tons, while in February exports were 369,000 tons; and from these comparisons it is clear that the tonnage exports may be taken as having represented an unchanged rate in the last eight months for which data are available.

These tonnage exports, however, include scrap, pig iron, cast-iron pipe and fittings, bar iron and radiators and cast-iron boilers. As it is inadvisable to attempt to estimate the amount of pig iron involved in finished steel exported, the proper comparison is made by taking finished steel only and omitting scrap, pig iron and iron castings. Eliminating these, a condensed statement of our direct exports of steel in the eight months is as follows:

	GROSS TONS
Billets, etc. ....	506,461
Wire rods ....	111,819
Rails ....	371,817
Bars ....	371,125
Wrought pipe and fittings....	84,477
Structural material ....	180,304
Barb wire ....	222,617
Other wire ....	156,955
Wire nails ....	77,016
All other ....	547,375
Total steel .....	2,629,966

With unimportant exceptions these steel products exported are in the same stage of finish as the "finished rolled steel" commonly reported in American statistics. In 1913, our best year, the production of pig iron was 30,966,152 tons, the production of steel ingots 30,280,130 tons, and our production of rolled steel 23,112,986 tons, there being a loss of 23.7 per cent from the steel ingot to the commercial steel. At the present time the proportions are different, and our current rates of production may be taken substantially as follows: Pig iron, 40,000,000 tons; steel ingots, 42,000,000 to 43,000,000 tons; finished rolled steel, 31,000,000 to 32,000,000 tons. The steel exports noted above for eight months are at the rate of 3,950,000 tons a year, representing 12½ per cent of the production.

Last July and August the production was materially less than at present, and thus the tonnage exports represented a larger proportion of the current production than has been the case lately. There has been, however, a large increase in the exports of manufactures, not returned by weight, involving the consumption of steel. Thus machinery increased from an average of \$11,425,000 in July and August last to \$14,200,000 in January and February. Cars for steam railroads increased from \$500,000 to \$3,500,000. What is designated as "all other manufactures of iron and steel," but which of late has been made up chiefly of unloaded shells, increased from \$3,400,000 to \$15,000,000. "All other explosives," including in chief part loaded shells, increased from \$9,000,000 to more than \$12,000,000.

Thus while the tonnage steel exports have been practically constant since the middle of last year, but have represented a decreasing proportion of the total make, the steel consumed in manufactures exported has increased, and this has tended to retard the rate at which the percentage of steel used

directly or indirectly in the export trade has decreased. Observing the value of the various manufactures being exported at the present time, a rough but perhaps not very inaccurate estimate of the tonnage of rolled steel involved in their production is about 7½ per cent of the rolled steel being produced, which means that of the steel the mills are shipping about 20 per cent is for direct or indirect export. Last summer, with only slightly smaller exports, but with a considerably smaller production, the percentage was somewhat higher, but it is improbable that at any time the proportion rose to 25 per cent.

The bulk of these exports are for war purposes. The rails and railroad rolling stock, the machinery and the automobiles exported are chiefly in connection with the war.

It is interesting to note that Great Britain, although a belligerent, has an export iron and steel trade somewhat similar to our own. The current issue of the *Iron and Coal Trades Review* has an editorial directing attention to the fact that while the iron and steel exports of the United Kingdom have not fallen off greatly as compared with the rate before the war, they are now made up quite largely of exports for war purposes, to France and Italy, so that British iron and steel exports to colonies and neutral countries have become quite small. In the first three months of the year British exports to France included 137,769 tons of steel bars, chiefly for shells, of course, and 114,733 tons of pig iron, doubtless in large part for the making of shell steel. The French ammunition factories have been taking almost as much shell steel from England as from the United States, although doubtless France has been producing large quantities.

The popular inference from Mr. Schwab's statement would be that the war is causing but a small part of the present glut of prosperity in our steel trade. Altogether apart from what is referred to above, are the heavy purchases of steel for new buildings required for the war export trade in munitions and many other lines, the home machinery demand and the railroad buying due to war prosperity, and the widely ramifying call for steel from operations indirectly traceable to the war.

### "Something to Meet"

An important company manufacturing machinery in an Eastern city was asked by THE IRON AGE concerning the extent of additions it was reported to be planning. These extracts from its reply put very aptly the attitude of many employers in this time of unheard-of turmoil. They are not only food for thought to employees who see in present conditions nothing but present opportunity, but should sink into the minds of those employers whose policy in dealing with labor demands has been bounded by present seeming advantage:

It must be obvious to everybody that labor generally is not behaving itself in a way that would encourage or warrant spending money on extensions. Labor agitators have been doing their utmost to make this a closed shop town. Public sentiment is being aroused, and if we can continue open it is probable that some things will be done, both in this plant and other plants here, to take care of business that might be

secured. But there must be a reasonable prospect of carrying it on after it is secured.

We certainly believe in America for the long pull, and we know that America can only succeed when a major portion of her people are prospering. We want to prosper ourselves; we want our men to prosper. We do not believe they are prospering now, notwithstanding they are getting the highest wage they have ever been paid. We believe that they are learning to indulge themselves in ways that they cannot hope to continue, after these unprecedented conditions have passed—and they must pass. The teaching of the Good Book, "Sufficient unto the day," and of Omar Khayyam, "Live to-day and let to-morrow look after itself," does not go in industrial affairs. I feel that if we are sane, we will keep ourselves well in hand and possibly forego some profits that might be taken up to-day, to be lost in a thousand ways to-morrow; we certainly cannot go along, going up all the time. There must come a time when we go down; and when we go down, we want to go down on all fours and be prepared to meet whatever there is to meet. Our guess is that there will be something to meet.

Verily there will be "something to meet"—something for which the beginning of preparedness cannot come too soon.

### The Industrial Preparedness Inventory

The work of taking the industrial inventory of the country's resources for the information of the Government in time of need is now under way. An effort is being made to have it completed by May 20 or at the latest by June 1. The method is being left largely to each State's board of five directors, but detailed printed instructions have been distributed for the guidance of such so-called field aides, selected from the national engineering societies, as each board finds desirable to appoint.

Special emphasis is placed on the point that the schedule to be filled out by the manufacturer does not call for information of an intimate nature, but when he desires the manufacturer may mail the form to the Committee on Industrial Preparedness of the Naval Consulting Board, Engineering Societies Building, 29 West Thirty-ninth Street, New York City, instead of sending it to the board of his own State. Under the direction of W. S. Gifford, supervising director, an elaborate classification of the facilities of the country for making army and navy supplies, for both normal times and the case of national emergency, is to be given the Government, where all the confidential information will finally repose. Meanwhile the work is being done without financial support of the Government, but wholly, including postage and printing, by private contribution.

### Preparedness Meeting in Buffalo

A national preparedness meeting was held in Buffalo on April 26 at the Hotel Statler under the auspices of the Engineering Society of Buffalo. The speakers were Elmer A. Sperry, member of the naval consulting board and the inventor of the Sperry stabilizing gyroscope, and Calvin W. Rice, secretary of the American Society of Mechanical Engineers. Mr. Sperry, who is chairman of the torpedo committee of the board, said that in the German submarines which had been captured, the engines were better than those we have, but "things very much worse than we would have are also found in them." Mr. Rice, in emphasizing that everyone must be enrolled in the preparedness movement if we are really to reach the prepared state, said that in the European war it has taken four rifles to one soldier—one in use, one away for repairs, one overheated and something else the matter with the fourth.

A French ministerial order of April 10, 1916, re-establishes permission to export zinc ores to the allies and American states.

## BRITISH STEEL EXPORTS

### March Record Exceeds January and February—Imports Changed But Little

British iron and steel exports in March, excluding iron ore and including scrap, were 307,488 gross tons, the largest thus far this year and considerably in excess of the monthly average for 1915. This expansion probably prompted the government order of mid-April prohibiting exports except by permission. In February the total was 283,250 tons and in January 292,203 tons.

Pig-iron exports continue to expand, those for March being 77,599 tons, against 71,314 tons in February and 70,313 tons in January. For the first quarter of this year the total was 219,226 tons (of which 114,733 tons went to France and 52,639 tons to Italy), against only 54,526 tons for the first quarter of 1915.

Steel-bar exports in March were 50,243 tons, against 38,035 tons in March, 1915. France took 41,014 tons. The total for the first quarter of this year was 165,901 tons, France taking 137,760 tons.

Ferromanganese exports in March were about 9600 tons, against 13,000 tons in February, and a monthly export rate in 1915 of about 8500 tons. Exports have been more liberal this year, as indicated by a total of about 30,000 tons for the first quarter, against 8700 tons for the first quarter of 1915.

Rail shipments continue small—only 3366 tons in March, against 17,572 tons in March, 1915. For the first quarter of 1916 they were 10,422 tons, against 56,860 tons to April 1, 1916. The galvanized sheet movement was 13,866 tons, against 29,669 tons in March a year ago. Tin-plate exports were 39,482 tons, against 27,289 tons in February and 26,271 tons in January.

Imports of iron and steel in March were 80,260 gross tons, which is only a little larger than the average for January and February. For the first quarter of 1916 they were 237,633 tons, against 204,370 tons in the first quarter of 1915, being still below the monthly average last year of 107,944 tons.

Imports of blooms, billets and sheet bars are declining. The March total was 13,362 tons, of which 10,206 came from the United States, as against 26,320 tons in March, 1915. The monthly average in 1915 was 35,666 tons. The imports for the first quarter of 1916 are only about two-thirds of those for the same quarter last year.

### Non-Ferrous Metal Boom in England

The non-ferrous metal industry of Birmingham, England, is in an unprecedented boom, with the output never so large. Nearly every metal-working plant has been enlarged or is about to be. A most important result, according to U. S. Consul Samuel L. Taylor, will be an enormously increased productive capacity which must make itself felt very strongly in the world's markets after the war.

During 1915 copper values rose from \$279.82 to \$391.75 per ton, spelter from \$133.82 to \$437.98, tin from \$715.37 to \$807.83 and lead from \$92.46 to \$138.69. Spelter's high mark was \$486.65 in the fall.

The scarcity of certain metals has led to a large amount of research work, the object being to produce new alloys and especially to meet government tests by the use of some substitute for spelter. This work is likely to lead to results of importance. The aluminum industry has advanced greatly, larger quantities than ever having been used for motor work and domestic, surgical and other uses.

### British Imports of Manganese Ore

British imports of manganese ore in March, 1916, were 30,476 gross tons, against 24,511 tons in February. To April 1, 1916, the year's imports were 87,098 tons, as compared with 86,605 tons to April 1, 1915, and 128,775 tons to April 1, 1914.



## WANT PITTSBURGH STEEL RATES

### Eastern Producers Ask the Same Footing on Freight to Pacific Coast

WASHINGTON, D. C., May 2, 1916.—A strong plea for the extension to the Eastern seaboard of the freight rate from the Pittsburgh district on iron and steel products destined for the Pacific coast was made before the Interstate Commerce Commission on April 27 by N. L. Moon, one of the witnesses who testified in the matter of the application of the Spokane Merchants' Association, to cancel existing tariffs carrying higher rates to intermediate points than to the coast. These differentials were based on the competition expected from the Panama Canal, but which, in view of the stoppage of traffic through that waterway, does not now exist, and the Spokane merchants contend that the commission can no longer permit what it claims constitutes a violation of the long-and-short haul clause of the interstate commerce act. Mr. Moon appeared as the representative of the Cambria Steel Company, Johnstown; Pennsylvania Steel Company, Steelton; Maryland Steel Company, Sparrows Point; Bethlehem Steel Company, South Bethlehem; American Iron & Steel Mfg. Company, Lebanon and Reading; Eastern Steel Company, Pottsville; Lukens Iron & Steel Company and Worth Brothers Company, Coatesville; Phoenix Iron Company, Phoenixville; Alan Wood Iron & Steel Company, Conshohocken, and Midvale Steel Company, Philadelphia. The steel manufacturers appear in this case in the attitude of interveners who desire to protect their interests. The application of the Spokane Merchants' Association, made early in April, has been expedited by the commission and the impression is strong that a final decision may be reached within a few days.

Prior to July 15, 1915, a blanket rate of 80c. prevailed from the Atlantic seaboard to the Missouri River on iron and steel articles shipped to Pacific coast terminals under which Eastern manufacturers built up a substantial and profitable business aggregating over 100,000 tons per annum, according to Mr. Moon's testimony. On July 15, as the result of facts developed in the original intermountain case, the rate from Chicago was reduced to 55c. and from points east of Chicago to 75c. per 100 lb. Subsequently a movement was set on foot by the transcontinental lines to secure authority to establish a rate of 55c. from Pittsburgh. The commission authorized a Pittsburgh rate of 65c.

"We are now subjected," Mr. Moon said, "to a rate of 10c. per 100 lb. higher than that prevailing from Pittsburgh and are absolutely dependent upon the rail carriers to get our traffic to the Pacific coast. The companies I represent have taken on a great many contracts for delivery of considerable tonnage, but the purchasers of that steel will have to pay 10c. per 100 lb. higher from our territory than from Pittsburgh." Steel makers in Eastern seaboard territory, he added, had been able to ship much material to the Pacific coast by turning it over to the boat lines, but that service is now suspended and there is no expectation of being able to ship by water in the near future. In answer to a question, Mr. Moon said that with the resumption of the ocean service at anything like the rates that were formerly in effect Eastern seaboard shippers might be able to lay their goods down on the coast at slightly lower prices than Pittsburgh, but he added that Pittsburgh shippers would have the material advantage of an all-rail movement. Pittsburgh, he said, could compete with the Eastern seaboard via New York and the canal under the existing rates of 9.5c. from the Eastern plants and 16.9 from Pittsburgh, because Pittsburgh's lower producing costs enabled steel makers in that district to put their products alongside a steamer for about 3c. per 100 lb. less than their competitors.

E. P. Bates, general freight agent of the Pennsylvania Railroad, speaking for the Eastern trunk lines, corroborated Mr. Moon's statement, saying: "It is the view of the trunk lines that the rates on iron and steel to the Pacific coast from the trunk line territory should be the same as from the Pittsburgh-Buffalo territory,

restoring the old parity of rates that has existed for so long and which has generally applied on commodities from the East to the Pacific coast."

The application of the Spokane Merchants' Association to modify existing rates to intermediate points because of the present lack of water competition was very generally opposed by railroad men and shippers on the ground that the commission cannot consider every temporary condition that may arise.

W. L. C.

### For Foreign Market Investigations

The most extensive investigations into foreign-market conditions ever undertaken at one time by the Bureau of Foreign and Domestic Commerce, Department of Commerce, will be under way soon after the beginning of the new fiscal year in July. These investigations will be aimed at the newer and more undeveloped markets lying well outside of the fighting zone, especially those in South America, China, India, Africa and Australia. Twelve lines are to be investigated and fifteen distinct examinations to find suitable agents for the work have been announced for some time in May.

For South America, agents are being sought to study and report on markets for construction material and machinery, fancy groceries, furniture, glass and glassware, jewelry and silverware, motor vehicles, paper and printing supplies, railroad supplies and stationery and office supplies. In the Far East, Africa and Australia, a study will be made of the markets for boots and shoes, electrical goods, motor vehicles and railroad supplies. One agent is also sought to look into the possibilities for American commercial and industrial investments in South America and another to make a similar study in the Far East.

### Steel Company of Canada's New Officers

The Steel Company of Canada, whose main office is in Hamilton, has elected new officers. Charles S. Wilcox retires as president and was made chairman of the board. Robert Hobson, formerly vice-president and general manager, was elected president and Cyrus A. Birge vice-president. F. H. Whitton, assistant manager, was made general manager. Ross H. McMaster, manager of the Montreal branch, was made assistant general manager. H. H. Champ was re-elected secretary and treasurer, C. F. Whitton assistant secretary, and H. S. Alexander treasurer. Robert Hobson, the new president, stated that the Canadian railroad companies are again coming in the market and are placing orders for rails for next year's delivery. Other matters were mentioned which mean a great deal of future business for the company. He further stated that the company's steel-making facilities are to be increased by the installation of three new open-hearth furnaces. With these additions in operation the company will be turning out about 1200 tons of steel per day.

### American Can's Dissolution Asked

At Baltimore, May 1, Assistant United States Attorney-General Todd filed in the United States Court a motion for a decree in the American Can Company anti-trust suit. The motion seeks to have the company declared a combination in restraint of trade, to have it dissolved and to have the Federal Trade Commission work out the dissolution plan. The court, in a recent decision, said it would suspend issuance of a decree during good behavior of the company. This is unsatisfactory to the Government. Mr. Todd's motion asking the court to order the company to submit its dissolution plan to the Federal Trade Commission is something new. If the company fails to present such a plan a receivership is asked. Mr. Todd further asked that the American Can Company owners be enjoined from holding stock in more than one of the companies formed from it.

Creditors of the Milwaukee Grinding Wheel Company, Milwaukee, Wis., are about to receive checks for a second dividend, amounting to 17½ per cent.



## The General Electric Company's Year

The twenty-fourth annual report of the General Electric Company shows a decided recovery in the year ended Dec. 31, 1915, from the depression of the previous year. The value of orders received was \$98,385,891, which was an increase of \$14,637,370 over 1914, or 17 per cent. The figures given for 1915 are exclusive of orders for special war munitions, which amounted to \$33,980,000. If these orders are added, the total will be far above that of the good year 1913, which was \$111,819,142.

The amount of sales billed in 1915 was \$85,522,070, a decrease of \$4,945,621, or 6 per cent, on 1914. As Chairman C. A. Coffin remarks that the increase in orders received in 1915 was largely due to the revival of business in the latter part of the year, this explains the falling off in the sales billed. The profit from sales was \$8,623,887, against \$8,970,963 in 1914, but the income from other sources was \$3,684,108, against \$2,884,420, so that the total net income was \$12,307,995, against \$11,855,383. After deductions for interest on bonds and dividends on stock, the amount carried to surplus at the close of 1915 was \$3,607,991, against \$3,145,059 a year previously.

Expenditures in 1915 for additions and improvements to manufacturing plants totaled \$4,485,068, against \$6,006,955 in 1914, and the amount written off at the close of 1915 was \$5,985,068, against \$4,370,792 at the close of 1914. Following its practice of several years, the company wrote off against income account its total expenditures in 1915 for patents and other outlays relating thereto amounting to \$838,455, carrying its patent account in the balance sheet at \$1 as in previous years.

The balance sheet shows a surplus Dec. 31, 1915, of \$23,692,871. In the liabilities are debenture bonds totaling \$12,049,000. Accounts payable, including quarterly dividend payable Jan. 15, 1916, are given at \$7,285,504. The company had out no note payable nor any paper bearing its indorsement. The assets show cash in hand of \$30,138,913; securities, accounts receivable, due from subsidiary companies, etc., \$58,716,024; merchandise inventories, \$88,579,319.

The number of employees engaged in the company's factories and offices and in those of its subsidiary companies at the end of 1915 was about 60,000.

The report states that the board has authorized the payment to all employees (except directors and general officers) who shall have been in its service consecutively for five or more years supplementary compensation during the year 1916 equal to 5 per cent of their individual earnings for the year.

## Locomotive Orders Falling Off in April

Orders for about 65 locomotives and inquiries for nearly 90 appeared in the last two weeks of April. The Norfolk & Western has ordered 20 Mallet locomotives and the Missouri Pacific 14 Santa Fes from the American Locomotive Company, while the Baldwin Locomotive Works will build 5 Santa Fes for the Southern Railroad in addition to the 40 locomotives ordered from that company recently. The Kansas City Southern is reported to have ordered 10 locomotives from the American Locomotive Company. New inquiries comprise 10 from the Terminal Railroad Association of St. Louis, 10 from the Denver & Rio Grande, 25 from the Canadian Government Railroads, 10 to 15 from the Seaboard Air Line and 12 from the Northern Railways of Spain.

The total orders in April are estimated at 228, of which 12 are foreign. The April orders were less than half those for either March or February, the total to May 1 being about 1600.

Because a machine was not properly guarded, a penalty of 15 per cent has been assessed against the Harsh & Edmonds Shoe Company, Milwaukee, by the Industrial Commission of Wisconsin, in fixing the compensation of an employee for personal injury. This is the first instance of the operation of the commission's rule that the employer be penalized for failure to guard a machine properly.

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PIG-IRON OUTPUT LESS

A Number of Furnaces Work Badly

Gain of Six in Active Stacks, Making a Total of 322 on May 1

Poor working put blast-furnace output back a trifle in April. THE IRON AGE's returns from the furnaces, largely received by wire, show that the production in the 30 days of last month was 3,227,768 gross tons, or 107,592 tons a day, against 3,337,691 tons in March, or 107,667 tons a day. Several additional furnaces were blown in in April and a few were blown out, the net gain being six. The capacity of the 322 furnaces active on May 1 was 109,072 tons a day, as compared with 108,459 tons as the capacity of the 316 furnaces in blast one month previous.

DAILY RATE OF PRODUCTION

The daily rate of production of coke and anthracite pig iron by months, from April, 1915, is as follows:

Daily Rate of Pig-Iron Production by Months—Gross Tons			
	Steel Works	Merchant	Total
April, 1915	52,804	17,746	70,550
May	54,655	18,360	73,015
June	59,022	20,339	79,361
July	62,895	19,796	82,691
August	67,801	21,865	89,666
September	70,977	24,108	95,085
October	73,595	27,227	100,822
November	73,282	27,962	101,244
December	73,647	29,686	103,333
January, 1916	72,614	30,132	102,746
February	75,305	31,151	106,456
March	76,274	31,393	107,667
April	77,115	30,477	107,592

OUTPUT BY DISTRICTS

The accompanying table gives the production of all coke and anthracite furnaces in April and the three months preceding:

Monthly Pig-Iron Production—Gross Tons				
	Jan. (31 days)	Feb. (29 days)	Mar. (31 days)	Apr. (30 days)
New York	196,448	191,648	205,034	189,312
New Jersey	4,371	0	0	1,538
Lehigh Valley	111,744	104,207	109,598	112,210
Schuylkill Valley	89,151	90,507	94,264	90,753
Lower Susquehanna and Lebanon Valley	66,651	61,362	63,142	69,407
Pittsburgh district	763,127	717,928	793,910	752,068
Shenango Valley	184,031	185,161	193,432	191,700
Western Pennsylvania, Maryland, Virginia and Kentucky	175,717	170,597	175,738	165,790
Wheeling district	89,513	85,056	93,376	90,584
Mahoning Valley	113,989	110,105	120,222	127,101
Central and Northern Ohio	271,306	310,742	334,527	309,045
Hocking Valley and Hanging Rock	263,090	240,271	247,833	239,963
Chicago district	50,774	45,850	53,237	50,120
Mich., Minn., Mo., Wis. and Col.	455,545	428,257	479,659	467,147
Alabama	97,120	95,806	113,099	119,634
Tennessee	229,584	226,688	235,483	227,417
	22,860	23,027	25,137	25,424
Total	3,185,121	3,087,212	3,337,691	3,227,768

PRODUCTION OF STEEL COMPANIES

Returns from all furnaces of the United States Steel Corporation and the various independent steel companies show the following totals of product month by month. Only steel-making iron is included in the figures below, together with ferromanganese and spiegeleisen. These last, while stated separately, are also included in the columns of "total production."

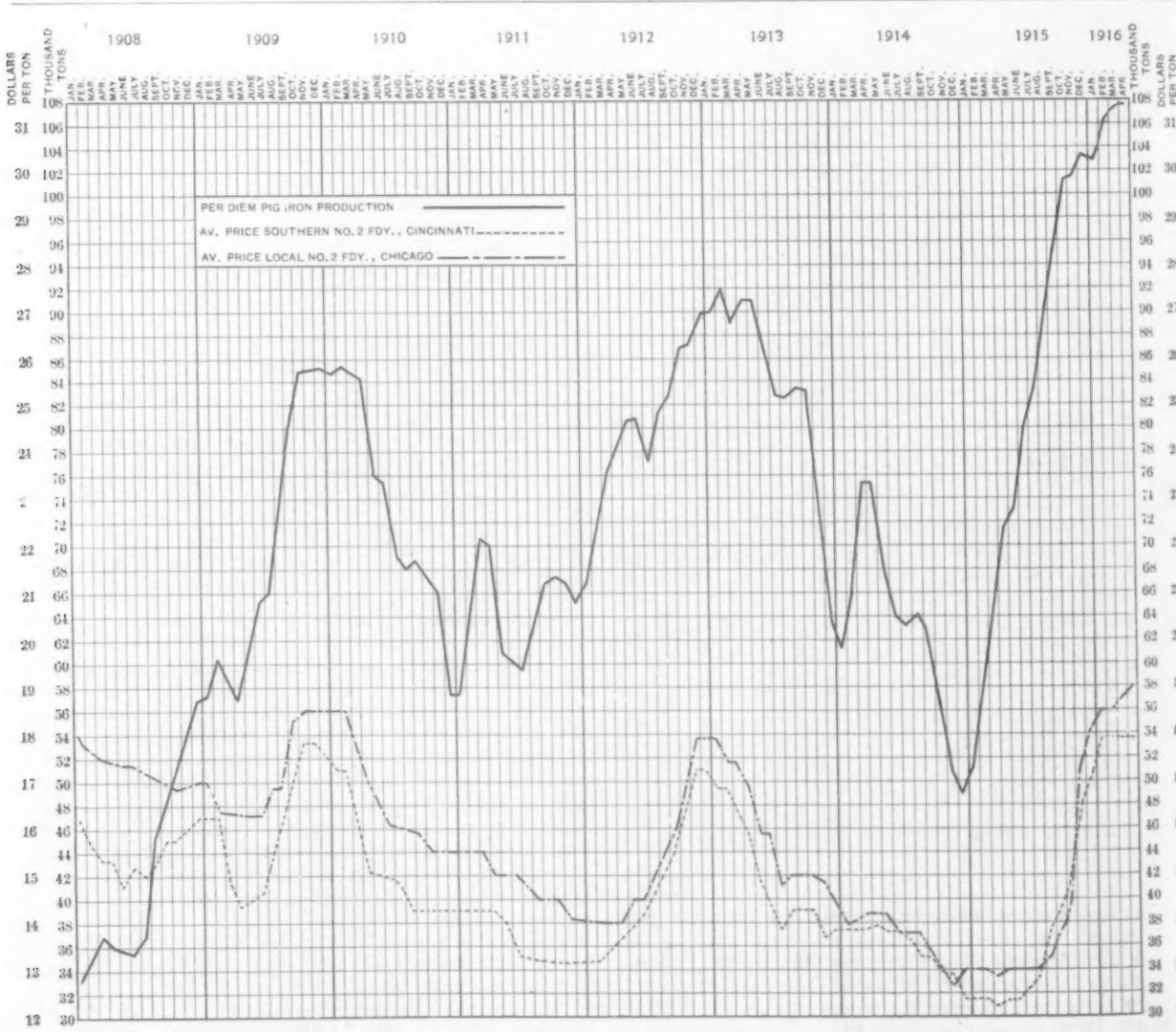


Diagram of Daily Average Production by Months of Coke and Anthracite Pig Iron in the United States from Jan. 1, 1908, to May 1, 1916; Also of Monthly Average Prices of Southern No. 2 Foundry Iron at Cincinnati and Local No. 2 Foundry Iron at Chicago District Furnace

Production of Steel Companies—Gross Tons

	Pig, total production—			Spiegeleisen and ferromanganese		
	1914	1915	1916	1914	1915	1916
Jan.	1,261,430	1,115,944	2,251,035	17,325	18,041	24,866
Feb.	1,329,414	1,237,390	2,183,845	10,524	13,319	23,877
Mar.	1,704,688	1,551,082	2,365,116	20,133	12,274	29,388
Apr.	1,635,226	1,584,111	2,314,902	18,676	12,337	29,996
May	1,457,847	1,694,290	.....	21,504	13,440	.....
June	1,329,623	1,770,657	.....	16,254	19,200	.....
July	1,395,851	1,949,750	.....	16,524	17,854	.....
Aug.	1,455,054	2,101,818	.....	11,577	27,463	.....
Sept.	1,390,322	2,129,322	.....	13,786	23,159	.....
Oct.	1,271,820	2,281,456	.....	17,435	23,992	.....
Nov.	1,059,159	2,198,459	.....	21,977	28,741	.....
Dec.	1,034,802	2,283,047	.....	20,733	25,004	.....

CAPACITY IN BLAST MAY 1 AND APRIL 1

The following table shows the daily capacity in gross tons of furnaces in blast May 1 and April 1 by districts:

Coke and Anthracite Furnaces in Blast

Location of furnaces	Total		May 1—		Apr. 1—	
	number of stacks	Number in blast	Capacity per day	Number in blast	Capacity per day	
New York:						
Buffalo	19	17	5,915	17	6,017	
Other New York	5	3	605	3	597	
New Jersey	6	1	154	0	0	
Pennsylvania:						
Lehigh Valley	20	13	3,429	14	3,413	
Spiegel	2	2	220	2	222	
Schuylkill Val.	12	10	3,025	10	3,041	
Lower Susquehanna	6	5	1,316	5	1,228	
Lebanon Valley	8	6	977	6	937	
Spiegel	1	1	119	0	0	
Pittsburgh Dist.	53	52	25,146	51	25,267	
Ferro	3	2	257	3	343	
Shenango Val.	19	19	6,390	19	6,240	
Western Pa.	22	18	5,481	17	5,654	
Ferro	4	2	100	3	165	
Maryland	3	3	1,238	3	1,250	
Spiegel	1	1	116	1	98	
Wheeling Dist.	14	13	4,563	12	4,440	
Ohio:						
Mahoning Val.	25	24	10,502	24	10,394	
Central and Northern	23	22	8,353	21	7,995	
Hock Val. and Hang'g Rock	15	11	1,671	11	1,717	
Ill. and Ind.	35	31	15,125	32	15,733	
Ferro	1	1	80	1	40	
Michigan, Wis. & Minn.	12	10	2,895	9	2,525	
Col. and Mo.	6	3	998	3	1,044	
Ferro	1	1	101	1	86	
The South:						
Virginia	18	10	1,180	9	1,136	
Kentucky	5	4	566	4	470	
Alabama	38	28	7,660	27	7,596	
Tennessee	15	9	890	8	811	
Total	392	322	109,072	316	108,459	

Furnaces blown in in April include Oxford in New Jersey, one Lebanon in the Lebanon Valley, Alleghany in Virginia, Belmont in the Wheeling district, one Lorain in Ohio, one Iroquois in the Chicago district, one Detroit in Michigan, one Ensley in Alabama and Helen in Tennessee.

Among furnaces blown out are Crumwold in the Lehigh Valley, one Gary and one Iroquois in the Chicago district.

THE RECORD OF PRODUCTION

Production of Coke and Anthracite Pig Iron in the United States by Months Since Jan. 1, 1912—Gross Tons

	1912	1913	1914	1915	1916
Jan.	2,057,911	2,795,331	1,885,054	1,601,421	3,185,121
Feb.	2,100,815	2,586,337	1,888,670	1,674,771	3,087,212
Mar.	2,405,318	2,762,563	2,347,867	2,063,834	3,337,691
Apr.	2,375,436	2,752,761	2,269,655	2,116,494	3,227,768
4 mo.	8,939,470	8,897,992	8,391,246	7,456,520	12,837,792
May	2,512,582	2,822,217	2,092,686	2,263,470	.....
June	2,440,745	2,628,565	1,917,783	2,380,827	.....
July	2,410,889	2,560,646	1,957,645	2,563,420	.....
Aug.	2,512,431	2,545,763	1,995,261	2,779,647	.....
Sept.	2,463,839	2,505,927	1,882,577	2,852,561	.....
Oct.	2,689,933	2,546,261	1,778,186	3,125,491	.....
Nov.	2,630,854	2,233,123	1,518,316	3,037,308	.....
Dec.	2,782,737	1,983,607	1,515,752	3,203,322	.....
Total	29,383,490	30,724,101	23,049,752	29,662,566	.....

DIAGRAM OF PIG-IRON PRODUCTION AND PRICES

The fluctuations in pig-iron production from January, 1908, to the present time are shown in the accompanying chart. The figures represented by the heavy lines are those of daily average production, by months, of coke and anthracite iron. The two other curves on the chart represent monthly average prices of Southern No. 2 foundry pig iron at Cincinnati and of local No. 2 foundry iron at furnace at Chicago. They are

based on the weekly market quotations of THE IRON AGE. The figures for daily average production, beginning January, 1909, are as follows:

Daily Average Production of Coke and Anthracite Pig Iron in the United States by Months Since Jan. 1, 1909—Gross Tons

	1909	1910	1911	1912	1913	1914	1915	1916
Jan.	57,975	84,148	56,752	66,384	90,172	60,808	51,659	102,746
Feb.	60,976	85,616	64,090	72,442	92,369	67,453	59,813	106,456
Mar.	59,232	84,459	70,036	77,591	89,147	75,738	66,575	107,667
Apr.	57,962	82,792	68,836	79,181	91,759	75,865	70,550	107,592
May	60,753	77,102	61,079	81,051	91,039	67,506	73,015	.....
June	64,656	75,516	59,585	81,358	87,619	63,916	79,361	.....
July	67,793	69,305	57,841	77,738	82,601	63,150	82,691	.....
Aug.	72,546	67,963	62,150	81,046	82,057	64,363	89,666	.....
Sept.	79,507	68,476	65,903	82,128	83,531	62,753	95,085	.....
Oct.	83,856	67,520	67,811	86,722	82,133	57,361	100,822	.....
Nov.	84,917	63,659	66,648	87,697	74,453	50,611	101,244	.....
Dec.	85,022	57,349	65,912	89,766	63,987	48,896	103,333	.....

Blast Furnace Notes

Rebecca furnace at Kittanning, Pa., which has been under lease for some months for the production of ferromanganese by the Jones & Laughlin Steel Company, has been turned over to the owners. After repairs the furnace will go on basic iron.

The Detroit Furnace Company, Detroit, Mich., will blow in its Wayne furnace this month.

The Detroit Iron & Steel Company blew in its A furnace April 10, and both stacks are now in operation.

The Alleghany Ore & Iron Company blew in its furnace at Iron Gate, Va., April 20.

No. 3 blast furnace of the National Tube Company at Lorain, Ohio, which has been relined and repaired, went in blast on April 23.

Some good records for output of Bessemer iron are being made by the Sharpsville furnace at Sharpsville, Pa., owned and operated by the Allen S. Davison Company, Oliver Building, Pittsburgh. This is a small stack, but in one day recently it made 192 tons and in April averaged about 175 tons daily.

No. 6 blast furnace at the Ohio works of the Carnegie Steel Company, Youngstown, Ohio, went out of blast on April 16 for slight repairs and was blown in again on April 27.

The Victoria stack of the Canadian Furnace Company, Ltd., at Port Colborne, Ont., is out of blast for relining.

Additional Open-Hearth Furnaces

The United Steel Company has revised its plans for its new steel plant, and is now installing ten 75-ton furnaces instead of six, as originally planned. All contracts for plant were placed last year. It is expected that steel will be taken out of the first two furnaces in May, out of six furnaces July 1, and out of ten furnaces Nov. 1. The plant has been laid out for an ultimate installation of fifteen furnaces. The gas producers will be built by the Morgan Construction Company, Worcester, Mass.

New Rennerfelt Electric Furnace

A ¾-ton, 175-kw. Rennerfelt electric steel furnace will be furnished by Hamilton & Hansell, New York, to the Parson Company, Newton, Iowa. The latter company makes manganese steel and other steel castings by the crucible process, which the new furnace will supplant. It specializes in trench-digging machinery. This installation makes a total of eight Rennerfelt furnaces in the United States and fifty-four in the world.

The report of the Pennsylvania Steel Company for the year ended Dec. 31, 1915, shows a surplus of \$2,010,957, as against a deficit of \$678,492 in the preceding year. Total income for the year was \$4,791,921, as compared with \$1,340,049 in 1914. Interest on the bonded indebtedness amounted to \$1,361,154, as against \$1,116,455 in the preceding year, and depreciation and other charges were \$1,419,910, as against \$902,086 the previous year.



# Iron and Steel Markets

## MANY LABOR CONFLICTS

### Pig-Iron Output Reaching the Limit

#### Advances in Wire Products—More Rail Buying for 1917—Plates for Japan

Labor troubles have been rampant this week in portions of the steel and metal working trades. These and the strikes previously under way have cut down steel consumption somewhat, and in a less degree the output of mills. At Pittsburgh the rioting originated outside of steel plants and the temporary shutdowns of the latter were precautionary. Iron and steel manufacturers were forehanded in advancing wages, and the May outbreaks have affected them less than was feared.

The metal working industry, now inured to strikes, has only taken on a certain number of new ones. At Cincinnati a fraction of the machinists went out. At Pittsburgh and elsewhere an 8-hr. day and the closed shop are demanded.

Throughout the iron and steel industries the explosive nature of the labor situation is recognized and its possibilities of interruptions in the coming summer are a factor in all forecasts.

April pig-iron production fell off enough to show the strain blast furnaces are under to keep near a 40,000,000-ton rate. The total for the 30 days was 3,227,768 tons, or 107,592 tons a day, against 3,337,691 tons in March, or 107,667 tons a day. Poor working of a number of furnaces tells the story of thinning linings that must soon be renewed.

A few stacks have blown in, but based on the smaller performance of April the 322 furnaces in blast May 1 are rated at only 109,072 tons a day, against 108,459 tons a day for the 316 furnaces active on April 1.

No relief from the pressure upon the mills is in sight, but new buying is less and the question at what prices future contracts should be made is exercising certain large interests, buyers of war steel in particular.

Some options on renewals of munitions contracts—the making of finished shells—that ran to May 1 have not been exercised, but as makers are behind on deliveries there is as yet no slackening in such work. More war steel is to be bought and more shell contracts are to be placed, but sellers want more than agents of foreign buyers have yet offered.

Rail requirements for 1917 were quite generally covered in the buying that ended with April, and some orders got on the books that the makers were disposed to put off. Of these, 25,000 tons were for the Erie, 18,000 tons for the Norfolk & Western, 10,000 tons for the Bessemer & Lake Erie. The C. & O. and the Southern Railway also added to their first orders. Probably 125,000 tons were taken in the week.

Canada is in the market for 30,000 tons of rails. Her mills have been crowded with war steel, yet the Pere Marquette's order for 15,000 tons of rails was taken by Algoma.

Some prices are probably near the top, but advances keep on coming. Wire nails were put at \$2.50 May 1, up \$2 a ton. Barb wire advanced \$2, but plain and galvanized wire, \$4. Wire at \$2.45 is now only \$1 a ton less than nails, while commonly \$3 lower. Some sellers have gone to \$2.60 on nails.

Pipe mills have made new prices on oil country goods that are \$4 to \$6 a ton higher. Bar iron is up \$2 a ton at Pittsburgh; splice bars \$3 to \$5 a ton, or to 2c., Pittsburgh.

Plate manufacturers see no end of their harvest. At Chicago sales have been made at 4c., Pittsburgh, to Japan and to Pacific coast buyers. Japan is buying here for the completion of several vessels. Atlantic coast shipyards will yet be heavy buyers of plates for all of 1917.

Warehouse prices are moving up rapidly. In Eastern districts bars and shapes were advanced \$3 last week and \$5 this week; in plates the advances were \$5 each week.

Pig iron is quieter in some markets, but the week's buying has shown fair totals in other quarters. Southern iron is less firm than Northern, and sales at \$15.50, Birmingham, have been made for the first half of 1917. At St. Louis 15,000 tons of basic were bought from Chicago, and 15,000 tons more are pending. A western Pennsylvania steel company has taken 25,000 to 30,000 tons of Bessemer at somewhat under \$21 at furnace. Foundry and machine-shop strikes have cut down the consumption of foundry iron, and there is as yet no spot market to help up prices.

## Pittsburgh

PITTSBURGH, PA., May 2, 1916.

Prices continue to go up. Advances the past week included \$2 per ton on ferrosilicon, \$2 on bar iron, \$2 on wire nails and \$4 on some wire products, and \$4 to \$6 per ton on iron and steel oil country goods. The mills still insist they are doing their best to hold prices in check, but without success, and that consumers are putting the market up on themselves by bidding high prices for material which the mills will not be able to furnish for six or eight months. On the other hand, the volume of new orders has lately fallen off considerably, indicating that some buyers have decided to wait and take chances on prices being lower when they are compelled to come in the market. The labor troubles in this city, Youngstown and other nearby places have seriously disturbed local conditions, and have heavily cut down output. At this writing every plant of the Westinghouse interests in the Pittsburgh district is idle, it being estimated that fully 32,000 men are out of work, although more than half of them are satisfied and willing to work if they could. The latest strike to break out here is among the machinists, which has further crippled operations of the foundries in this district. There is still an acute shortage in the supply of steel,

## A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics  
At date, one week, one month, and one year previous

Pig Iron, Per Gross Ton:	May 3, 1916.	April 26, 1916.	April 5, 1916.	May 5, 1915.
No. 2 X, Philadelphia...	\$20.50	\$20.50	\$20.50	\$14.25
No. 2, Valley furnace...	18.50	18.50	18.50	12.75
No. 2 Southern, Cin'ti...	17.90	17.90	17.90	12.40
No. 2, Birmingham, Ala.	15.00	15.00	15.00	9.50
No. 2, furnace, Chicago*	19.00	19.00	19.00	13.00
Basic, del'd, eastern Pa.	20.50	20.50	21.00	13.25
Bessemer, Valley furnace...	18.00	18.00	18.25	12.50
Bessemer, Pittsburgh...	21.95	21.95	21.95	14.55
Malleable Besse., Ch'go*	19.50	19.50	19.50	13.00
Gray forge, Pittsburgh...	18.70	18.70	18.70	13.45
L. S. charcoal, Chicago.	19.75	19.75	19.75	15.75

Billets, etc., Per Gross Ton:	May 3, 1916.	April 26, 1916.	April 5, 1916.	May 5, 1915.
Bess. billets, Pittsburgh...	45.00	45.00	45.00	20.00
O.-h. billets, Pittsburgh...	45.00	45.00	45.00	20.00
O.-h. sheet bars, P'gh...	45.00	45.00	45.00	21.00
Forging billets, base, P'gh	69.00	68.50	67.50	25.00
O.-h. billets, Phila...	50.00	50.00	50.00	22.02
Wire rods, Pittsburgh...	60.00	60.00	60.00	25.00

Finished Iron and Steel,	Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bess. rails, heavy, at mill	1.47 1/2	1.25	1.25	1.25	
Iron bars, Philadelphia...	2.659	2.659	2.559	1.17 1/2	
Iron bars, Pittsburgh...	2.60	2.50	2.50	1.20	
Iron bars, Chicago...	2.35	2.35	2.35	1.15	
Steel bars, Pittsburgh...	3.00	3.00	2.75	1.20	
Steel bars, New York...	3.169	3.169	2.919	1.369	
Tank plates, Pittsburgh...	3.75	3.75	3.50	1.15	
Tank plates, New York...	3.919	3.919	3.669	1.319	
Beams, etc., Pittsburgh...	2.60	2.60	2.50	1.20	
Beams, etc., New York...	2.769	2.769	2.669	1.369	
Skelp, grooved steel, P'gh	2.35	2.35	2.35	1.12 1/2	
Skelp, sheared steel, P'gh	2.45	2.45	2.45	1.17 1/2	
Skelp hoops, Pittsburgh...	3.00	3.00	3.00	1.25	

\*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire,	May 3, 1916.	April 26, 1916.	April 5, 1916.	May 5, 1915.
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh	2.85	2.85	2.85	1.80
Galv. sheets, No. 28, P'gh	5.00	5.00	5.00	3.40
Wire nails, Pittsburgh...	2.50	2.40	2.40	1.55
Cut nails, Pittsburgh...	3.60	2.60	2.30	1.55
Fence wire, base, P'gh...	2.45	2.25	2.25	1.35
Barb. wire, galv., P'gh...	3.35	3.25	3.25	2.10

Old Material, Per Gross Ton:	May 3, 1916.	April 26, 1916.	April 5, 1916.	May 5, 1915.
Iron rails, Chicago...	\$18.00	\$18.00	\$18.00	\$11.75
Iron rails, Philadelphia...	20.00	20.00	20.00	14.50
Carwheels, Chicago...	13.00	13.50	14.00	9.75
Carwheels, Philadelphia...	17.00	17.00	17.50	11.00
Heavy steel scrap, P'gh...	17.25	17.25	18.25	11.75
Heavy steel scrap, Phila...	17.50	17.50	18.00	11.00
Heavy steel scrap, Ch'go...	16.00	16.50	16.50	9.25
No. 1 cast, Pittsburgh...	16.25	16.25	16.25	12.00
No. 1 cast, Philadelphia...	17.50	17.50	18.00	11.75
No. 1 cast, Ch'go (net ton)	12.75	12.75	13.00	9.00

Coke, Connellsville, Per Net Ton at Oven:	May 3, 1916.	April 26, 1916.	April 5, 1916.	May 5, 1915.
Furnace coke, prompt...	\$2.25	\$2.00	\$2.75	\$1.50
Furnace coke, future...	2.50	2.40	2.90	1.85
Foundry coke, prompt...	3.25	3.25	3.75	2.00
Foundry coke, future...	3.25	3.25	3.50	2.15

Metals,	Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York...	29.00	28.75	27.50	21.00	
Electrolytic copper, N. Y.	28.50	28.50	27.37 1/2	18.62 1/2	
Spelter, St. Louis...	17.85	18.00	17.50	14.00	
Spelter, New York...	17.50	18.25	17.75	14.25	
Lead, St. Louis...	7.37 1/2	7.37 1/2	8.00	4.07 1/2	
Lead, New York...	7.50	7.50	8.00	4.20	
Tin, New York...	52.50	49.75	50.62 1/2	39.00	
Antimony, Asiatic, N. Y.	37.50	39.50	45.00	35.00	
Tin plate, 100-lb box, P'gh	\$5.00	\$4.50	\$4.50	\$3.15	

and this is also keeping down output of finishing mills. This situation will be largely relieved, however, within the next 90 days, when quite a good deal of open-hearth capacity, now being built, will be finished. Coke, pig iron and scrap are quiet, with prices ruling only fairly steady. Scrap has touched the lowest prices reached in some months, but seems likely to go lower. Several steel concerns report the largest output and shipments in April of any 30-day month in their history. There is not a sign anywhere of prices giving way on finished iron and steel, but, on the contrary, indications point to further advances.

**Pig Iron.**—W. P. Snyder & Co. report the average price of Bessemer iron for April, on actual sales of 1000 tons and over, to have been \$20.70, Valley furnace, a decrease of 16c. per ton on the March average price, and on basic \$18, a decrease of 25c. It now develops that the 60,000 tons of Bessemer iron, bought recently by the Youngstown Sheet & Tube Company, was at \$20.50, Valley furnace. The new demand for pig iron is quiet, but prices are firm. The United Steel Company, Canton, Ohio, is credited with having bought 5000 tons of basic at \$18.50 at Canal Dover, with a 60c. freight rate to Canton, making the price \$19.10, delivered. The report is confirmed that the Cambria Steel Company is a buyer of Bessemer iron, the amount supposed to be 25,000 to 30,000 tons, and the price not above \$21, Valley furnace, and perhaps slightly under. Reports of some of the steel company furnaces in the Pittsburgh district going out of blast soon are probably correct, as it is known two or three stacks are liable to be put out at any time for necessary relining and repairs. Nearly all sellers of Bessemer iron are quoting \$21.50 at furnace, but this price has been obtained only for small lots for prompt shipment. Basic iron is more plentiful than Bessemer, but is firm at \$18, Valley furnace, some sellers asking as high as \$18.50. We quote Bessemer iron at \$21 to \$21.50; basic, \$18 to \$18.50; gray forge, \$17.75 to \$18; malleable Bessemer, \$18.50 to \$19, and No. 2 foundry, \$18.50 to \$19, all at Valley furnace, the freight rate from furnace for delivery in the Pittsburgh or Cleveland district being 95c. per ton.

**Billets and Sheet Bars.**—Actual orders sent to the

mills for rolling by the billet and rail bureau of the Carnegie Steel Company in April were the largest in any 30-day month in the history of that company. There is an insistent demand for billets and sheet bars from consumers who are running their mills full time but are not getting steel as fast as they need it. Billets for prompt shipment still bring premiums over prices for delivery in the next three or four months, and we note a sale of 1000 tons of open-hearth billets, May and June shipment, at \$50, delivered. It is said, however, that sheet bars have recently sold at \$42, f.o.b. Cleveland, and this would be slightly less than \$45, delivered, Pittsburgh. We also note a sale of 50 tons of low-carbon forging billets at \$69, Pittsburgh. For delivery over the second and third quarters we quote: Bessemer billets, \$45; open-hearth billets, \$45; Bessemer sheet bars, \$45, and open-hearth sheet bars, \$45, maker's mill, Pittsburgh or Youngstown district. We quote forging billets at \$69 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 and up to 0.60 carbon take \$1 extra.

**Ferromanganese.**—There is a lull in new inquiry for ferromanganese, and prices are lower for both prompt shipment and contracts. Sales of 2500 to 3000 tons of domestic 80 per cent ferromanganese for delivery over remainder of the year are reported at about \$200 per ton at furnace. This material will come from furnaces at Sheridan and Lebanon, Pa., and Sparrows Point, Md. Offerings of prompt ferromanganese are being made more freely, and several cars have been sold at about \$350 per ton. Prompt spiegeleisen is very hard to obtain, and for delivery in three to four months 20 to 30 per cent is held at \$70 to \$75 per ton at furnace. Prices on 50 per cent ferrosilicon are unchanged, but with the supply not equal to the demand. We quote 50 per cent ferrosilicon at \$95 for lots up to 100 tons, over 100 tons and up to 600 tons, \$84, and over 600 tons, \$83 all per gross ton, f.o.b. Pittsburgh. Prices of Bessemer ferrosilicon for delivery over remainder of the year are now quoted as follows: 9 per cent, \$32; 10 per cent, \$33; 11 per cent, \$34; 12 per cent, \$35; 13 per cent, \$36.50; 14 per cent, \$38.50; 15 per cent, \$40.50, and 16 per cent, \$43. Seven per cent silvery for the same delivery is

\$28.50; 8 per cent, \$29; 9 per cent, \$29.50; 10 per cent, \$30; 11 per cent, \$31, and 12 per cent, \$32. All these prices are f.o.b. at furnace, Jackson or New Straitsville, Ohio, or Ashland, Ky., each of these points having a freight rate of \$2 per gross ton to Pittsburgh.

**Steel Rails.**—Effective May 1, the Carnegie Steel Company started to quote Bessemer standard section rails at 1.47½c. per lb. and open-hearth at 1.56½c. These prices are practically equivalent to \$33 for Bessemer rails and \$35 per ton for open-hearth. It is understood that most of the order of the Pennsylvania Railroad taken by the Carnegie Steel Company is for 125-lb. with some 150-lb. rails, and these will be rolled on the new No. 2 rail mill at Bessemer, Pa. The new demand for light rails is active, running 5000 to 6000 tons per week or more. The output of the three steel rail mills at the Edgar Thomson works is practically sold for all of this year. The expected advance in prices of light rails has not yet been made. We quote light rails as follows: 25 to 45-lb. sections, 2.10c.; 16 and 20 lb., 2.15c.; 12 and 14 lb., 2.20c., and 8 and 10 lb., 2.25c., in carloads and up to 100 tons. An advance of 5c. per 100 lb. is charged for less than carloads and down to three tons, while under three tons an additional 5c. is charged. We quote standard section rails of Bessemer stock at 1.47½c., and of open-hearth steel, 1.56½c., Pittsburgh.

**Structural Material.**—Fabricators report the new demand fairly active. The McClintic-Marshall Company has taken 500 tons for a new boiler house for the Atlantic Refining Company, Philadelphia. The American Bridge Company has taken 1426 tons for the Westinghouse high school, and a local interest is reported to have taken 5500 tons for the new Boody House at Toledo, Ohio. About 5000 tons of steel will be needed for extensions of the Brier Hill Steel Company at Youngstown, Ohio, but bids have not yet been asked. We quote beams and channels up to 15 in. at 2.50c. to 2.75c. at mill, for delivery in third quarter and fourth quarter of this year. Small lots for prompt delivery from warehouse stocks are held at 3.25c. to 3.50c. and higher.

**Plates.**—Sales of fairly large lots of ¼-in. and heavier sheared plates for delivery in two to three months have been made at 3.50c. and up to 4c. at mill. The output of plates at the Homestead steel works and also at the Upper and Lower Union mills of the Carnegie Steel Company in April is said to have been the heaviest in any one month in the history of those plants. New inquiry for cars is light, the roads refusing to pay the high prices quoted by car builders. Plates, ¼ in. and heavier, for prompt shipment range from 3.50c. to 5c. at mill. We quote ¼-in. and heavier plates for delivery at convenience of the mill, which would be in four to six months, at 2.65c. to 2.75c.

**Sheets.**—Shipments of sheet and tin mill products by the leading mills in April are said to have made a new record for a 30-day month. Specifications against contracts for blue annealed, electrical and deep stamping sheets are very heavy, especially from automobile builders, nearly all of whose requirements are greater this year than in any previous year. The sheet mills are still unable to get bars promptly, and this is keeping down output to some extent. We quote Nos. 9 and 10 blue annealed sheets at 2.90c. to 3c.; No. 28 Bessemer black, 2.85c. to 2.90c.; open-hearth, 2.95c. to 3c.; No. 28 galvanized Bessemer stock, 4.90c. to 5c., and open-hearth, 5c. to 5.10c., most mills holding for the higher prices on both grades. We quote Nos. 22 and 24 black plate, tin mill sizes, H. R. and A., 2.70c.; Nos. 25, 26 and 27, 2.75c.; No. 28, 2.85c.; No. 29, 2.95c., and No. 30, 3c. These prices are for carload and larger lots, f.o.b. mill, Pittsburgh.

**Tin Plate.**—Sales for export have been made at \$5.50 per base box and higher, and it is claimed the price for either export or domestic use in a short time will be \$6 per box. We note one sale of 20,000 boxes for export at \$5.50, and another sale of 50,000 to 60,000 boxes is said to have been made at a higher price. One leading maker is not quoting on export inquiries, having its entire output sold up to October. We quote small lots from stock at \$5 to \$5.25 per base box, prices depending on sizes, quantity and deliveries wanted. We quote 8-lb.

coated ternes at \$7.75 for 200 lb. and \$8 to \$8.25 for 214 lb., all f.o.b. maker's mill, Pittsburgh.

**Cold-Rolled Strip Steel.**—Additional contracts for cold-rolled strip steel for delivery in third quarter of this year have been placed at \$6 to \$6.25 per 100 lb., and it is said one or two mills are now quoting \$6.50. On small lots for shipment at convenience of the mill, which would be in two to three months, from \$7 to \$8 is quoted, and several small lots have been sold at above \$8 per 100 lb. Extras that are standard with all the mills were printed in full on page 810 in THE IRON AGE of March 30.

**Skelp.**—Any prices quoted are purely nominal, as local skelp mills are sold up for practically the remainder of this year. We quote grooved steel skelp at 2.35c. to 2.40c.; sheared steel skelp, 2.45c. to 2.50c.; grooved iron skelp, 2.70c. to 2.80c., and sheared iron skelp, 3c. to 3.10c., all delivered to consumers' mills in the Pittsburgh district.

**Railroad Spikes.**—New inquiry is much more active, negotiations being on for 100,000 kegs or more, but railroads are very slow to close, as they object to paying the high prices quoted by the makers. These inquiries are for 1917 delivery, and makers are standing firm on their prices, stating that if they cannot obtain orders for spikes they can put the steel into other products for which there is a heavy demand and a greater profit. We quote:

Standard railroad spikes, 4½ x 9/16 in. and larger, \$2.65 to \$2.75; railroad spikes, ½ and 7/16 in., \$2.75 base; railroad spikes, ¾ in. and 5/16 in., \$3.05 base; boat spikes, \$2.80 base, all per 100 lb., f.o.b. Pittsburgh.

**Rivets.**—It is said orders are being placed for rivets at the advanced prices which went into effect on April 20. The demand is very active, both domestic and foreign, and rivet makers cannot get out a full output on account of slow deliveries of steel from the mills. For immediate shipment and on contracts up to and including Sept. 30, 1916, structural rivets are quoted at \$3.75 and boiler rivets at \$3.85 per 100 lb., base; for fourth quarter of 1916, structural rivets are quoted at \$4 and boiler rivets at \$4.10 per 100 lb., base, f.o.b. Pittsburgh, terms 30 days net, or one-half of 1 per cent for cash in 10 days.

**Nuts and Bolts.**—Both the domestic and export demand is very heavy, and makers of nuts and bolts say they are back in deliveries 8 to 10 weeks or longer. Deliveries of steel from the mills are very slow, and this is keeping down the output. The discounts, effective from April 20, which makers state are for prompt acceptance only, are as follows, delivered in lots of 300 lb. or more where the actual freight rate does not exceed 20c. per 100 lb., with terms 30 days net or 1 per cent for cash in 10 days:

Carriage bolts, small, rolled thread, 50, 10 and 5 per cent; small, cut thread, 50 and 5; large, 40 and 5.

Machine bolts, h.p. nuts, small, rolled thread, 50, 10 and 10 per cent; small, cut thread, 50 and 10; large, 40, 10 and 5.

Machine bolts, c.p.c. and t. nuts, small, 50 per cent; large, 35 and 10.

Blank bolts, 40, 10 and 5 per cent; bolt ends, with h.p. nuts, 40, 10 and 5 per cent; with c.p. nuts, 35 and 10. Rough stud bolts, 20. Lag screws (cone or gimlet point), 60.

Forged set screws and tap bolts, 15 per cent. Cup and round point set screws, case hardened, 60. Square and hexagon head cap screws, 55. Flat, button, round or flister head cap screws, 55.

Nuts, h.p. sq. tapped or blank, \$2.90 off list; hex., \$2.90 off; c.p.c. and t. sq. tapped or blank, \$2.60 off; hex., \$3 off; semi-finished hex., 60 and 10 per cent; finished and case hardened, 60 and 10.

Rivets, 7/16 in. in diameter and smaller, 45, 10 and 10 per cent.

**Wire Nails.**—Effective Monday, May 1, prices on wire nails, barb wire and galvanized fence staples were advanced \$2 per ton, and plain and galvanized wire \$4 per ton. Inconsistencies are thus introduced. Wire nails are now \$2.50 and plain annealed wire is \$2.45 per 100 lb., a differential of only 5c. Wire nails are usually 25c. to 30c. per 100 lb. higher than plain wire. The keg alone costs 13c. to 15c., and in addition there is the cost of cutting the wire into nails. No advance in prices was made in woven wire fencing, which remains at 61½ per cent off in carload lots. This figures out \$2.49 per



100 lb., while the rods from which the wire for this fencing is made are selling at \$60 to \$65 and higher per ton. Mills report the demand for wire nails and plain and galvanized wire very heavy, but on woven wire fencing only fair, the farmers refusing to pay the high prices ruling. There is a fair export demand, but the mills are filled so far ahead on domestic orders that they are not able to take much foreign business and make the deliveries wanted. Prices in effect from May 1 are as follows: Wire nails \$2.50 per keg; galvanized, 1 in. and longer, taking an advance over this price of \$2, and shorter than 1 in., \$2.50. Plain annealed wire, \$2.45 per 100 lb.; galvanized wire, \$3.15; galvanized barb wire and fence staples, \$3.35; painted barb wire, \$2.65; polished fence staples, \$2.65; cement coated nails, \$2.50, base, all f.o.b. Pittsburgh, with freight added to point of delivery, terms 60 days, net, less 2 per cent off for cash in 10 days. Discounts on woven wire fencing are now 61½ per cent off list for carload lots; 60½ per cent for 1000-rod lots and 59½ per cent for small lots, f.o.b. Pittsburgh.

**Shafting.**—This material, in small lots for fairly prompt shipment, has sold close to base price. A leading maker reports having entered large contracts for third and fourth quarter delivery this year at 15 per cent off, and other makers have entered similar contracts. For delivery in two to three months 10 per cent off is quoted, with the supply very limited. We quote cold-rolled shafting at 15 per cent off in carload lots for delivery in third and fourth quarters, and 10 per cent off in less than carload lots, f.o.b. Pittsburgh, freight added to point of delivery.

**Iron and Steel Bars.**—The new demand for steel bars for reinforcing purposes is very heavy, a local mill taking 2500 tons in the past week for Cleveland delivery. On iron and steel bars mills are sold up for three or four months, and prices quoted for prompt delivery range from 3c. to 3.25c. for steel bars, and close to 3c. on iron bars. Local mills are turning down foreign inquiries for steel rounds, their present obligations being so heavy they cannot make the deliveries wanted. We quote steel bars at 2.60c. to 2.75c. for delivery in third and fourth quarters, while for prompt shipment from warehouse 3.25c. to 3.50c. is quoted. There has been an advance of about \$2 per ton in common iron bars, which we now quote at 2.60c. to 2.70c., and railroad test bars at 2.70c. to 2.80c. at mill.

**Hoops and Bands.**—Both hoops and bands for fairly prompt delivery are quoted at 3c. and higher at maker's mill. Nominal prices are 2.75c. to 2.85c. for delivery at convenience of the mill, which would be in five or six months.

**Merchant Steel.**—Two local mills report their output and shipments in April to have been the heaviest in any one month in their history, and say they are back in deliveries four or five months. Nominal prices on small lots for delivery at convenience of the mill are about as follows: Iron finished tire, ½ x 1½ in. and larger, 2.35c., base; under ½ x 1½ in., 2.50c.; planished tire, 2.55c.; channel tire, ¾ to 1 in., 2.85c. to 2.95c.; 1½ in. and larger, 3.25c.; toe calk, 2.95c. to 3.05c., base; flat sleigh shoe, 2.70c.; concave and convex, 2.75c.; cutter shoe, tapered or bent, 3.25c. to 3.35c.; spring steel, 2.95c. to 3.05c.; machinery steel, smooth finish, 2.75c.

**Wrought Pipe.**—Effective Monday, May 1, discounts on oil country goods, 2½ to 6 in., were lowered three points, an advance of \$6, and on 7 to 12 in. two points, an advance of \$4 per ton. These advances are practically the same as were put in effect on April 21 on standard pipe. The new demand for tubular goods of all kinds is enormously heavy and mills are sold up to August or later. Several mills report that actual orders entered for tubular goods in April were very close to being three times as large as in April last year. Prices are very firm and another advance is looked for in the near future if the present heavy demand keeps up. Discounts on iron and steel pipe are given on another page in this issue.

**Boiler Tubes.**—Several local makers state that on iron and steel boiler tubes they are practically sold out

for the remainder of this year, while on seamless tubes they are sold up to the first quarter of 1917. Premiums are being paid on iron and steel tubes for delivery in two to three months from date of order. Prices are very firm and likely to be higher in the very near future. Discounts now in effect are given on another page.

**Old Material.**—The local scrap market is very quiet, but there has been a fair amount of new buying of heavy steel scrap for delivery at Sharon, Pa., and in the Youngstown district. Embargoes are still on for scrap routed to the Cambria Steel Company at Johnstown, Pa., and the Allegheny Steel Company at Brackenridge, Pa. We note sales of 5000 to 6000 tons of heavy steel scrap at \$17.50, delivered at Sharon and Youngstown. Borings and turnings are very dull and prices are weak. Dealers quote for delivery in the Pittsburgh and near-by districts that take the same rates of freight, per gross ton, as follows:

Heavy steel melting scrap, Steuben-	
ville, Follansbee, Brackenridge,	
Sharon, Monessen, Midland and	
Pittsburgh, delivered .....	\$17.25 to \$17.50
No. 1 foundry cast .....	16.25 to 16.50
Re-rolling rails, Newark and Cam-	
bridge, Ohio, Cumberland, Md., and	
Franklin, Pa. ....	17.50 to 17.75
Hydraulic compressed sheet scrap ..	15.50 to 15.75
Bundled sheet scrap, sides and ends,	
f.o.b. consumers' mills, Pittsburgh	
district .....	13.75 to 14.00
Bundled sheet stamping scrap .....	13.00 to 13.25
No. 1 railroad malleable stock .....	15.50 to 16.00
Railroad grate bars .....	12.50 to 12.75
Low phosphorus melting stock .....	20.50
Iron car axles .....	26.50 to 27.00
Steel car axles .....	26.00 to 26.50
Locomotive axles, steel .....	29.00 to 29.50
No. 1 busheling scrap .....	15.50 to 16.75
Machine shop turnings .....	10.25 to 10.50
Old carwheels .....	15.00 to 15.25
Cast-iron borings .....	10.25 to 10.50
*Sheet bar crop ends .....	18.00
No. 1 railroad wrought scrap .....	19.50 to 20.00
Heavy steel axle turnings .....	13.50 to 13.75
Heavy breakable cast scrap .....	14.50 to 14.75

\*Shipping point.

**Coke.**—The situation in coke is reported a little better, due to a heavy cut in the output and also to the fact that a good deal of blast furnace coke that was pressing the market to find sale has been cleaned up. Three or four by-product coke plants in Ohio will not be making coke for two or three months later than originally expected. One plant of 204 by-product ovens in the Youngstown district that was expected to be making coke in June, it is now stated, will not be ready for operation before August. Some grades of blast furnace coke are offered as low as \$2 for prompt shipment, but best grades are held at \$2.25 and higher. We note a sale of 3000 tons of furnace coke per month for the last half of the year, of best grade, at \$2.50 per net ton at oven. We now quote furnace coke for spot shipment at \$2 to \$2.25 and on contracts for last half of the year at \$2.50 to \$2.60 per net ton at oven. We quote best grades of 72-hr. foundry coke at \$3 to \$3.25 for prompt shipment and \$3.25 to \$3.50 on contracts for last half. The Connellsville *Courier* gives the output of coke in the Connellsville region for the week ended April 22 as 446,220 net tons, a decrease over the previous week of 16,700 tons.

## Chicago

CHICAGO, ILL., May 3, 1916.—(By Wire.)

Seldom has the pig-iron market so defied analysis. The widest range of opinion prevails as to the choice of buying policies for the future. The buying of iron for first-half delivery, already inaugurated on a substantial scale, persists despite conservative opinion among sellers and buyers alike. Purchases for last half consumption continue in surprising quantity. Notwithstanding all estimates indicate melters' requirements to be well covered, yet the Southern market remains weak and Northern iron is readily available for prompt shipment. In this market prophecy of higher prices is confronted with numerous instances of concessions. Buying was again more active last week. The stove manufacturers, the large radiator interest and the basic users of St. Louis being prominent participants. The

buying of rails completed prior to May 1 put upon the books of the mills a larger tonnage than has ever been placed in the same period, and purchases of track fastenings were in like amount. In the specific nature of these commitments another influence is added to the stability of conditions through 1917. In the taking of bridge and building contracts the American Bridge Company continues the important factor. Western steel mills followed last week the lead of the Carnegie Steel Company in its announcement of an advance of \$1 per ton for structural shapes and bars and \$3 for plates. Contracting for bolts and rivets and negotiations in connection with last-half requirements of rail-steel bars contributed to a larger activity among buyers than had been true in the preceding fortnight. Various materials, intermittently available in limited quantity from the smaller mills, are eagerly taken up by the users, and sales of galvanized and special finish sheets and plates at high prices are a characteristic feature of the situation. Wire products are up from \$2 to \$4 per ton.

**Pig Iron.**—Another spurt of buying activity is engaging the attention of the makers of all grades of iron. The purchase from the Indiana Harbor furnaces of 10,000 tons of basic by the Commonwealth Steel Company and 5000 tons by the Scullin Steel Company will take the excess output of those stacks for a period, the iron to be shipped beginning May 1 and at the convenience of the seller. A sale of 1000 tons of malleable iron to a central Illinois foundry for last half delivery followed from one of several inquiries from malleable foundries, of which a total of about 5000 tons still remains to be closed. Another sale of 500 tons is noted. Aside from the activity of the large radiator interest, which is figuring on a number of lots of iron, among them one for from 8000 to 13,000 tons of Southern foundry, the prominent inquiry, for both last and first half, has been that of the stove manufacturers. At Joliet 2000 tons was bought for first half and at Aurora 500 tons for last half. A Chicago maker of foundry equipment is inquiring for 2500 tons of foundry iron for last half and a Freeport manufacturer has added to previous purchases of 1200 tons for last half another lot of 500 tons. Furnace quotations for both Northern and Southern iron are in competition with attractive offers of special lots of iron or of resale iron, and in a number of instances contract shipments are being postponed by the melters in order to take in these offerings at favorable prices. Negotiations for Southern iron in large quantity indicate that the business will be placed on the basis of \$15, Birmingham, although for the ordinary inquiry \$15.50 appears to be the market. Northern iron is quotable at \$19 for foundry and \$19.50 for malleable. Merchant furnaces have appeared consistently unwilling to meet the price at which recent sales of basic have been made. For Lake Superior charcoal iron we quote delivery prices at Chicago to include a freight rate of \$1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b., furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5.....	\$19.75
Lake Superior charcoal, No. 1.....	20.25
Lake Superior charcoal, No. 6 and Scotch....	20.75
Northern coke foundry, No. 1.....	19.50
Northern coke foundry, No. 2.....	19.00
Northern coke foundry, No. 3.....	18.50
Southern coke, No. 1 f'dry and 1 soft.....	\$19.50 to 20.00
Southern coke, No. 2 f'dry and 2 soft.....	19.00 to 19.50
Malleable Bessemer.....	19.50
Basic.....	19.00 to 19.50
Low phosphorus.....	34.00 to 36.00
Silvery, 8 per cent.....	31.50
Bessemer ferrosilicon, 10 per cent.....	35.50

(By Mail)

**Rails and Track Supplies.**—The rail tonnage now on mill books is tremendously impressive. Requirements of the railroads through 1917 appear to have been provided for, and there is little expectation of further buying for some time to come. The rail purchases were accompanied by correspondingly large orders for track fastenings, including spikes, bolts, angle bars and tie-plates. With the exception of a total of about 10,000 tons of tie-plates, sold at the \$50 price, purchases were on the basis of \$45 at the mill. An interesting feature

of rail and track supply contracts is the fact that they call for specific tonnages with the elimination of the usual 15 per cent allowance for over or under specification. The mills likewise have committed themselves to no optional tonnage. We have revised our quotations as follows: Standard railroad spikes, 2.75c., base; track bolts with square nuts, 3.25c. to 3.50c., base, all in car-load lots, Chicago; tie-plates, \$50, f.o.b. mill, net ton; standard section, Bessemer rails, Chicago, 1.47½c., base; open hearth, 1.56½c.; light rails, 25 to 45 lb., 1.80c.; 16 to 20 lb., 1.85c.; 12 lb., 1.90c.; 8 lb., 1.95c.; angle bars, 1.50c. to 1.75c., Chicago.

**Structural Material.**—Contracts for fabricated steel reported last week include 4000 tons for the Statler Hotel at St. Louis, taken by the American Bridge Company, which also took 680 tons for the Illinois Steel Company plant extension, 600 tons for a Duluth & Iron Range Railroad car repair shop and 640 tons for the Louisville Gas & Electric Company power station. The Chicago, Burlington & Quincy Railroad placed about 300 tons of center sills and inquired also for an additional 300 tons of plain channels. It is reported that the Michigan Central will put out an inquiry for 1500 tons for a car shop at Jackson, Mich., and that 3000 tons is pending for a department store at Toledo, Ohio. The Southern Railway will have 1600 cars built at the Lenoir Car Works, the Illinois Central is in the market for 300 wood stock cars and the Rock Island for 300 center sills. Following the advance announced by the Carnegie Steel Company, the Illinois Steel Company has raised its price for plain material \$1 per ton and we quote for Chicago delivery of structural steel from mill 2.689c.

We quote for Chicago delivery of structural steel from jobbers' stock 3.10c.

**Plates.**—Sales of ship plates for Japan and the Pacific coast have been made at Chicago on the basis of 4c., Pittsburgh, among them a lot of 1500 tons. Other instances of quotations of 3.75c. and 4c., for smaller quantities of tank steel, are noted as securing business. There remains a very considerable inquiry for both ship and tank plates in this market. For third quarter contracts the larger Eastern mills are quoting 3.50c., Pittsburgh. A local mill has some plate tonnage to sell and is asking from 3.50c. to 4c., depending upon the circumstances of the individual order. The advance of \$3 per ton has become effective in the West, and we quote for Chicago delivery of plates from mill on contracts 3.089c., and for prompt shipment 3.689c. to 4.189c.

We quote for Chicago delivery of plates from store, 3.50c.

**Sheets.**—A Pittsburgh mill having some galvanized sheets to sell for early delivery disposed of the entire quantity almost at once, the portion placed in this market going at 5c., Pittsburgh. The demand for sheets of special finish continues urgent, metal furniture and automobile manufacturers being especially insistent. The market is holding uniformly around 3c., Pittsburgh, for one-pass and blue-annealed open-hearth stock, with some shading for Bessemer roofing sheets. We quote for Chicago delivery, blue annealed, No. 16 and heavier, 3.089c. to 3.189c.; box annealed, No. 17 and higher, 3.089c. to 3.189c.; No. 28 galvanized, 5.189c.

We quote for Chicago delivery of sheets out of stock, minimum prices applying on bundles of 25 or more, as follows: No. 10 blue annealed, 3.40c.; No. 28 black, 3.10c. to 3.20c.; No. 28 galvanized, 5.40c. to 5.50c.

**Rivets and Bolts.**—The recent advance in the price of rivets is not yet completely established for the Western trade. Quotations range from 3.50c. to 3.75c., with no sales as yet reported at the higher figure. Manufacturers who are finding it difficult to secure rods are requiring specifications 90 days in advance of contract delivery dates. Contracting by the railroads and implement interests for last half bolt requirements is in full swing, and last week saw the closing of a large business, with almost as much still pending. We quote: Carriage bolts up to ¾ x 6 in., rolled thread, 50-10-5; cut thread, 50-5; larger sizes, 40-5; machine bolts up to ¾ x 4 in., rolled thread, with hot pressed square nuts, 50-10-10; cut thread, 50-10; larger sizes, 40-10-5; gimlet point coach screws, 60; hot pressed nuts, square, \$2.90 off per 100 lb.; hexagon, \$2.90 off. Structural



rivets,  $\frac{3}{4}$  to  $1\frac{1}{4}$  in., 3.50c. to 3.75c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

We quote out of store: Structural rivets, 3.50c.; boiler rivets, 3.60c.; machine bolts up to  $\frac{3}{8}$  x 4 in., 65-5; larger sizes, 65; carriage bolts up to  $\frac{3}{8}$  x 6 in., 65; larger sizes, 50-15 off; hot pressed nuts, square, \$3.70, and hexagon, \$3.80 off per 100 lb., lag screws, 65-10-5.

**Bars.**—The bar-iron mills are well sold up for the coming 8 to 10 weeks, although, in some sizes and in limited quantities, earlier deliveries are obtainable. The minimum quotation of 2.35c. still obtains. Mild steel bars have been advanced \$1 per ton. The demand for bars rolled from rail steel is well sustained. The implement interests are beginning to negotiate for their last half contracts. We quote mill shipments, Chicago, as follows: Bar iron, minimum, 2.35c.; soft steel bars, 2.689c.; hard steel bars, 2.50c. to 2.75c.; shafting, in carloads, 20 per cent off; less than carloads, 15 per cent off.

We quote store prices for Chicago delivery: Soft steel bars, 3.10c.; bar iron, 3.10c.; reinforcing bars, 3.10c., base, with 5c. extra for twisting in sizes  $\frac{1}{2}$  in. and over and usual card extras for smaller sizes; shafting 15 per cent off.

**Cast-Iron Pipe.**—The leading interest has taken 400 tons of pipe for Blue Island, Ill. Municipal inquiry which will come up for prices in the current week calls for no large tonnages, but includes four or five jobs of from 150 to 200 tons. Recent specifications against contracts have been bringing a round tonnage to the foundries, and routine orders for both water and gas pipe are above the average. We quote as follows, per net ton, Chicago: Water pipe, 4 in., \$33.50 to \$34; 6 in. and larger, \$30.50 to \$31, with \$1 extra for class A water pipe and gas pipe.

**Old Material.**—The very low prices at which carwheels are being offered are a conspicuous feature of the weakness which is affecting the scrap market generally. A large number of wheels on track is resulting in forced sales, and offers are freely solicited on the basis of \$13 delivered. The spread between the present price of carwheels and of pig iron is exceptional. In contrast, locomotive tires are commanding steadily advancing prices, largely by reason of the scarcity of semi-finished steel. No. 1 railroad wrought is also being well supported through the influence of higher prices prevailing in Eastern markets. The embargo is still in force at Indiana Harbor. Rerolling rails are slightly weaker, sales being noted on the basis of \$17.75 delivered, with a freight of 50c. per ton. Railroad scrap offerings show large quantities of steel rails, the 3500-ton list of the Chicago & Northwestern including 1000 tons, the Santa Fe having 1500 tons on a list aggregating 5200 tons, while the Vandalia is offering 1600 tons of rails, as well as 650 tons of miscellaneous scrap. The Pennsylvania Lines have a large list out. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

#### Per Gross Ton

Old iron rails	\$18.00 to \$18.50
Relaying rails	19.50 to 20.50
Old carwheels	13.00
Old steel rails, rerolling	17.50 to 18.00
Old steel rails, less than 3 ft.	18.50 to 19.00
Heavy melting steel scrap	16.00 to 16.50
Frogs, switches and guards, cut apart	16.00 to 16.50
Shoveling steel	15.25 to 15.75
Steel axle turnings	11.00 to 11.50

#### Per Net Ton

Iron angles and splice bars	\$18.50 to \$19.00
Iron arch bars and transoms	19.75 to 20.25
Steel angle bars	15.50 to 16.00
Iron car axles	24.00 to 24.50
Steel car axles	26.50 to 27.00
No. 1 railroad wrought	17.00 to 17.50
No. 2 railroad wrought	15.50 to 16.00
Cut forge	15.50 to 16.00
No. 1 busheling	13.75 to 14.25
No. 2 busheling	9.75 to 10.25
Pipes and flues	12.25 to 12.75
Steel knuckles and couplers	15.50 to 16.00
Steel springs	16.00 to 16.50
No. 1 boilers, cut to sheets and rings	11.25 to 11.75
Boiler punchings	14.00 to 14.50
Locomotive tires, smooth	19.50 to 20.00
Machine shop turnings	7.25 to 7.50
Cast borings	7.00 to 7.50
No. 1 cast scrap	12.75 to 13.25
Stove plate and light cast scrap	10.75 to 11.25
Grate bars	11.00 to 11.25
Brake shoes	11.25 to 11.50
Railroad malleable	13.75 to 14.25
Agricultural malleable	11.25 to 11.75

**Wire Products.**—Announcement of an advance of \$4 per ton in the price of plain wire and \$2 per ton for

nails, barb wire and staples has been made by the principal producers, and we have revised our quotations as follows: Plain wire, No. 8 and coarser, base, \$2.639; wire nails, \$2.689; painted barb wire, \$2.839; galvanized barb wire, \$3.539; polished staples, \$2.839; galvanized staples, \$3.539, all Chicago.

## Philadelphia

PHILADELPHIA, PA., May 2, 1916.

Two eastern Pennsylvania plate makers are quoting 4c., Pittsburgh, or 4.159c., Philadelphia, as their minimum price, deliveries to be at the convenience of the mills, and in one case, at least, this means that shipment will be made late this year or early in next. The demand for plates leads the market. Railroads and street railways which have not ordered rails heretofore are active in getting their 1917 requirements booked. The demand for structural shapes continues to come mainly from those who are enlarging industrial plants. Two such propositions call for 3000 and 6000 tons respectively. In pig iron the week has been quiet and uneventful, but prices continue firm. Old material has an easier tone. There is much speculation as to the harm which may be done by the widespread strikes, but no tangible effects have been felt as yet. If they continue, however, it is expected that consumers will request a slowing up of deliveries of raw materials.

**Pig Iron.**—Considerable inquiry is current, most of it for last-half delivery, while there is call also for small lots of prompt to fill in, but actual business in the past week has been quiet, a condition which exists in all grades. The market is not depressed, and the trade views the situation as one of those periods which come between buying movements. Furnace stocks of pig iron, as a whole, have decreased a few thousand tons. A plate maker is so well stocked with basic that he has requested that further shipments be held up for a time. More iron might be taken were it not that the producer's storage space is limited because of extensions to the mill, which are now under way. Shipments to New England have been made more freely in the past few days, but they are again becoming more restricted; in fact, some embargoes are already in effect again. Prices, generally, are unchanged. Quotations for standard brands, delivered in buyer's yards, prompt shipment, range about as follows:

Eastern Pa., No. 2 X foundry	\$20.50 to \$21.00
Eastern Pa., No. 2 plain	20.25 to 20.75
Virginia, No. 2 X foundry	21.25
Virginia, No. 2 plain	20.75
Gray forge	19.50
Basic	20.50 to 21.00
Standard low phosphorus	34.00 to 35.00

**Iron Ore.**—The only arrivals reported at this port in the week ended April 29 consisted of 5640 tons from Sweden. Importers are finishing up old contracts.

**Ferroalloys.**—No change is apparent in the situation. Spot 80 per cent ferromanganese is a little easier, as was the case a week ago, but not much is offered. The spot quotation is nominally \$400, last quarter at \$200 and first half at \$175, but the entire market is quiet. Prompt spiegeleisen is scarce and quotations are lacking in the absence of business. Bessemer ferrosilicon is quoted at \$36.44, Philadelphia, for 10 per cent and \$37.44 for 11 per cent. Contract ferrosilicon, 50 per cent, stands at \$83 to \$85, Pittsburgh.

**Plates.**—The leading makers have advanced their quotation to 4c., Pittsburgh, or 4.159c., Philadelphia, shipment at the convenience of the mill, which in most cases means next January, and some of the larger consumers have contracted at these terms. Where small prompt lots can be squeezed out of rolling schedules, 5.50c., Eastern mill, continues to be obtained. The railroads continue eager for plates. One maker adheres to 3.75c., Pittsburgh, or 3.909c., Philadelphia, for third quarter shipment, and is not making many commitments for the fourth quarter. One lot for delivery in Texas was taken recently at 3.50c., Pittsburgh.

**Steel Rails.**—The Pennsylvania Steel Company has received the following orders for rails, 1917 delivery: 1600 tons from E. W. Clark & Co., bankers, representing several traction companies; 2000 tons from Western



Maryland Railroad, 1000 tons from Norfolk & Western, 1000 tons from Bay State Railway, 550 tons from the Trenton & Mercer County Traction Company, 1000 tons from the Public Service Railway Company of New Jersey, 1500 tons from the Philadelphia Rapid Transit Company, and 500 tons from the Canton Railroad. All are for T-rails, except 1000 tons for the Philadelphia Rapid Transit Company.

**Bars.**—The nominal quotation for steel bars continues at 2.909c. The quotation for iron bars is unchanged at 2.659c., Philadelphia, but some makers ask \$2 per ton over this price.

**Structural Material.**—A contract was placed last week with the Belmont Iron Works for 6000 tons required in the construction of the Sun Shipbuilding Company's plant on the Delaware River. The ultimate requirement may be 9000 tons. The Midvale Steel Company is about to place the contract for 3000 tons required for a 3-story machine shop at Nicetown, Philadelphia. The contract has been let for 500 tons required for an addition to the Snellenburg department store, this city. The minimum quotation is unchanged at 3c., Pittsburgh, or 3.159c., Philadelphia, and eastern Pennsylvania mills have more orders than they can conveniently handle. One which has not gone into the fourth quarter could dispense with 20 per cent of the business it has in view and yet keep busy to the end of the year.

**Billets.**—Open-hearth rerolling billets are quoted at \$50 to \$55, but are difficult to obtain. Forging steel is quoted nominally at \$65 to \$70, but more than these figures is asked by some makers. The steel most easily obtained consists of material discarded in making shell rounds.

**Sheets.**—No. 10 blue annealed sheets command 3.909c. to 4.159c., Philadelphia.

**Coke.**—Some interest is shown in contract furnace coke, which is quoted at \$2.80 to \$3 per net ton at oven; spot, \$2.25 to \$2.50. Either contract or spot foundry ranges about \$3.50 to \$3.75 per net ton at oven. Freight rates from the principal producing districts are as follows: Connellsville, \$2.05; Latrobe, \$1.85, and Mountain, \$1.65.

**Old Material.**—Freight embargoes are in force at Coatesville and Parkesburg, a situation which acts as a deterrent to business. Some mills elsewhere are holding up shipments to avoid demurrage charges. The market is easy. There is an excessive supply of turnings. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania, and taking freight rates from 35c. to \$1.35 per gross ton, are as follows:

No. 1 heavy melting steel.....	\$17.50 to \$18.00
Old steel rails, rerolling.....	19.00 to 20.00
Low phos. heavy melting steel scrap.....	22.50 to 23.25
Old steel axles.....	26.00 to 27.00
Old iron axles.....	28.00 to 29.00
Old iron rails.....	20.00 to 20.50
Old carwheels.....	17.00 to 17.50
No. 1 railroad wrought.....	23.00 to 23.50
Wrought-iron pipe.....	14.50 to 15.00
No. 1 forge fire.....	15.00 to 15.50
Bundled sheets.....	15.00 to 15.50
No. 2 busheling.....	11.00 to 11.50
Machine shop turnings.....	10.00 to 10.50
Cast borings.....	11.00 to 11.50
No. 1 cast.....	17.50 to 18.00
Grate bars, railroad.....	13.50 to 14.00
Stove plate.....	13.50 to 14.00
Railroad malleable.....	14.50 to 15.00

The three Scandinavian countries, when it was announced that Germany would have to raise the prices of iron exported to them, took joint action and requested the German Steel Works Union, which controls such exports, not to use the new regulations as a means of cancelling or failing to carry out current contracts. Danish engineering firms in the meantime advertised the necessity of raising these prices.

Commenting on the recent statement in THE IRON AGE that Germany produced 129,646 metric tons of steel in electric furnaces last year under war conditions, the Snyder Electric Furnace Company writes that if the Snyder electric steel furnaces recently contracted for and those now in operation were suddenly mobilized for war service they would turn out 77,975 tons of steel in 12 months on a 24-hr. basis.

## Cincinnati

CINCINNATI, OHIO, May 3, 1916. (By Wire).

**Pig Iron.**—Disturbed labor conditions have adversely affected the market, and foundry iron contracting is practically at a standstill. Few sales were made in this vicinity last week, and there are no inquiries of consequence. The only general one is for 600 tons of mixed Northern and Southern grades from Jeffersonville, Ind., for last-half shipment. A few sales in central Ohio are reported, but the total tonnage is limited. Southern foundry iron stocks are on the increase, and this, coupled with the small demand at present, undoubtedly retards any advances in prices that were predicted here 30 days ago. Southern No. 2 foundry is unchanged at \$15, Birmingham basis, for second-quarter shipment, but orders for delivery through the third quarter can be placed at the same price. For strictly last-half business \$15.50 is quoted, and this same figure can be inserted in contracts for shipment in the first half of 1917. Northern makers are firm at \$19, Ironton, for this year's shipment, and while the quotation for the first half of next year is \$20, some contracts have been made at \$19. Resale Northern No. 2 foundry at \$18.50 for nearby deliveries is said to be very scarce, but there has not been enough iron sold in this territory lately to justify reporting that this low-priced iron has entirely disappeared. The Ohio silvery irons are still quoted at \$29, furnace, for 8 per cent silicon, but this price has not yet been firmly established. Based on freight rates of \$2.90 from Birmingham and \$1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft.....	\$18.40 to \$18.90
Southern coke, No. 2 f'dry and 2 soft.....	17.90 to 18.40
Southern coke, No. 3 foundry.....	17.40 to 17.90
Southern No. 4 foundry.....	16.90 to 17.40
Southern gray forge.....	16.40 to 16.90
Ohio silvery, 8 per cent silicon.....	28.26 to 28.76
Southern Ohio coke, No. 1.....	21.26
Southern Ohio coke, No. 2.....	20.26
Southern Ohio coke, No. 3.....	19.76
Southern Ohio malleable Bessemer.....	20.26
Basic, Northern.....	20.26
Lake Superior charcoal.....	21.20 to 22.20
Standard Southern carwheel.....	25.40 to 25.90

(By Mail)

**Finished Material.**—No change in quotations has been made. The local jobbers have sufficient stocks of wire nails on hand to enable them to make the previously quoted price of \$2.65 per keg base. The store price of barb wire is \$3.50 per 100 lb.; plain steel bars, 3.20c.; twisted steel bars, 3.35c.; No. 10 blue annealed sheets, 3.50c.; plates, 3.50c.; small structural shapes, 3.20c. The nearby mills are quoting No. 28 galvanized sheets around 5.15c. to 5.20c., Cincinnati or Newport, Ky., and No. 28 black sheets from 3.15c. to 3.25c.

**Old Material.**—Prices are again sagging and a reduction of 25c. per ton has been made all along the line, although some grades of scrap could probably be bought on a firm offer below the regular listed quotations. The rolling mills are not consuming as much scrap as usual, while offerings are heavier. The minimum figures given below represent what dealers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations are dealers' prices, f.o.b. at yards.

Per Gross Ton	
Bundled sheet scrap.....	\$12.25 to \$12.75
Old iron rails.....	16.25 to 16.75
Relaying rails, 50-lb. and up.....	21.50 to 22.00
Rerolling steel rails.....	15.25 to 15.75
Heavy melting steel scrap.....	14.50 to 15.00
Steel rails for melting.....	13.75 to 14.25

Per Net Ton	
No. 1 railroad wrought.....	\$13.75 to \$14.25
Cast borings.....	6.00 to 6.50
Steel turnings.....	6.00 to 6.50
Railroad cast scrap.....	11.50 to 12.00
No. 1 machinery scrap.....	13.25 to 13.75
Burnt scrap.....	8.25 to 8.75
Iron axles.....	20.00 to 20.50
Locomotive tires (smooth inside).....	17.25 to 17.75
Pipes and flues.....	10.00 to 10.50
Malleable and steel scrap.....	11.25 to 11.75
Railroad tank and sheet scrap.....	9.00 to 9.50

**Coke.**—From \$2.25 to \$2.50 per net ton at oven is quoted for Connellsville prompt shipment, while contract figures range from \$2.50 to \$2.75. Wise County and Pocahontas furnace brands are quoted around \$2.50 to \$3. Foundry coke contracting is light, and prices in the

three fields are from \$3.50 to \$3.75, but the temporary shortage in the Connellsville supply has caused producers to advance to \$3.75 at oven for prompt shipment. The Connellsville labor situation is not satisfactory, but no trouble is experienced now in getting sufficient cars in which to make shipments. New River foundry coke is quoted at \$4 to \$4.25.

## St. Louis

ST. LOUIS, Mo., May 1, 1916.

**Pig Iron.**—Transactions have been heaviest in Northern basic iron. The sales recorded were one of 5000 tons and one of 10,000 tons. An inquiry for about 15,000 tons of Southern basic is still in the market. Other sales included one of 500 tons of Lake Superior charcoal iron. An inquiry for 750 tons of No. 2 Southern foundry for 1917 delivery has appeared.

**Coke.**—The delivery situation has not improved and sales have been for small lots. By-product coke of local plants is firm in parallel with Connellsville prices.

**Finished Iron and Steel.**—The chief event of the week was the booking by the American Bridge Company of 4000 tons for the new Statler Hotel in St. Louis. Specifications are beyond the allotments originally contemplated and therefore rather slow at the moment. Fabricators have taken all the material they could get and their yards are therefore in good shape. They report business increasing rapidly. In light rails business is being taken at 1.70c., base, which is a differential of 40c. as compared with Pittsburgh, due to the overloaded condition of the Pittsburgh plants and the relatively easy situation with some Western makers. Movement out of warehouse is brisk and at firm prices. We quote for stock out of warehouse as follows: Structural material, 3.15c.; soft steel bars, 3.15c.; iron bars, 3.10c.; tank plate, 3.55c.; No. 10 blue annealed sheets, 3.45c.; No. 28 black sheets, cold rolled, one pass, 3.30c.; No. 28 galvanized sheets, black sheet gage, 5.60c.

**Old Material.**—Scrap softened materially in the week, but as no sales of consequence were made the quotations presented are for the most part nominal. The embargoes of the mills are largely responsible for the situation coupled with the heavy quantities of railroad material recently thrown on the market with another series of offerings expected this week. Rejections are reported the severest in many years and dealers are having considerable difficulty in consequence. At the same time mills and foundries are working at a sharp pace with the inevitable consequence of heavy reductions of stocks of material on hand. Lists out during the week include one of 2300 tons from the Vandalia, one of 200 tons from the Standard Oil Company and one of 200 tons from the St. Joseph & Grand Island. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district, as follows:

### Per Gross Ton

Old iron rails.....	\$17.00 to \$17.50
Old steel rails, re-rolling.....	17.00 to 17.50
Old steel rails, less than 3 ft.....	16.50 to 17.00
Relaying rails, standard section, subject to inspection.....	22.00 to 23.00
Old carwheels.....	12.75 to 13.25
No. 1 railroad heavy melting steel scrap.....	15.50 to 15.75
Heavy shoveling steel.....	13.25 to 13.50
Frogs, switches and guards cut apart.....	15.25 to 15.50
Bundled sheet scrap.....	9.00 to 9.25

### Per Net Ton

Iron angle bars.....	\$16.00 to \$16.50
Steel angle bars.....	13.50 to 14.00
Iron car axles.....	23.50 to 24.00
Steel car axles.....	25.50 to 26.00
Wrought arch bars and transoms.....	19.25 to 19.75
No. 1 railroad wrought.....	16.00 to 16.25
No. 2 railroad wrought.....	15.50 to 15.75
Railroad springs.....	14.75 to 15.00
Steel couplers and knuckles.....	14.25 to 14.50
Locomotive tires, 42 in. and over, smooth inside.....	18.75 to 19.25
No. 1 dealers' forge.....	12.00 to 12.50
Cast borings.....	8.00 to 8.25
No. 1 busheling.....	13.50 to 14.00
No. 1 boilers, cut to sheets and rings.....	9.25 to 9.75
No. 1 railroad cast scrap.....	12.00 to 12.50
Stove plate and light cast scrap.....	9.00 to 9.50
Railroad malleable.....	11.25 to 11.75
Agricultural malleable.....	10.25 to 10.75
Pipes and flues.....	10.50 to 11.00
Heavy railroad sheet and tank scrap.....	9.75 to 10.25
Railroad grate bars.....	9.00 to 9.50
Machine shop turnings.....	8.50 to 8.75

## Birmingham

BIRMINGHAM, ALA., May 1, 1916.

**Pig Iron.**—Birmingham pig iron is more uniformly on the basis of \$15 for spot and \$15.50 for second half than in some time. A lot of 400 tons for May delivery brought \$15.50 and 1000 tons of high silicon Clifton brought \$18. Orders coming in recently have been mostly from regular customers who are taken care of at prevailing rates. The volume of transactions is small, but inquiries, especially from the Middle West, are frequent. Dickering for 1917 delivery has not materialized in orders. Business could be done on a basis of \$16 for first half with most dealers. No large sale is reported, but some indications of buyers reappearing are seen. Resale iron is believed to be going fractionally under the market, but furnace interests are not cutting under. The most encouraging feature is the readiness with which consumers are taking their iron. One large interest reports many of them as anticipating delivery and another reports deliveries due during the coming month as twice the make. The car shortage, while not acute, is spasmodically bad, first on one road and then another. Altogether, delayed shipments considerably hamper movements from yards. One maker is of the opinion that the enormous use of scrap in foundry and mill mixtures has been responsible for the absence of some iron orders that would otherwise have been given. High-priced pig iron led to the use of scrap in quarters not heretofore heard from in that connection. The foundry business of the South, especially in the Birmingham district and in the Southwest, has picked up considerably. The general position of Southern furnace interests is to accept the present high profits and wait the turn without anxiety. There may be an increase in output by June 1. The second Vanderbilt stack expects to go in at that time and the Sloss-Sheffield Company will blow in a second City stack about the same time, or as soon as coke can be secured from the Coalburg beehive ovens now under repair. We quote, per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 1 foundry and soft.....	\$15.50 to \$16.00
No. 2 foundry and soft.....	15.00 to 15.50
No. 3 foundry.....	14.50 to 15.00
No. 4 foundry.....	14.25 to 14.75
Gray forge.....	14.00 to 14.50
Basic.....	15.00 to 15.50
Charcoal.....	22.50 to 23.00

**Cast-Iron Pipe.**—It has been an uneventful week in the pipe market, but prices are firm at the recent advances. Wiley Alford and A. M. Shook, Jr., of Birmingham, and A. H. Campbell of Gadsden, have organized the National Pipe & Foundry Company and will build a soil pipe plant at Gadsden to be operated by hydroelectricity, furnished by the Alabama Power Company. We quote, per net ton, f.o.b. pipe shop yards as follows: 4-in., \$29; 6-in. and upward, \$26, with \$1 per net ton added for gas pipe and 16-ft. lengths.

**Coal and Coke.**—Domestic coal is dull, owing to the season. Steam coal is picking up slightly, with the prospect of renewal of orders by large consumers and yard stocking. Coke is very firm at \$4.50 per net ton at oven, for handpicked Yolande, Brookwood and other standard beehive foundry, with furnace coke selling at \$3.20 to \$3.40. Foundry coke is scarce and the demand is brisk.

**Old Material.**—Steel and wrought-iron scrap continue active, but other grades of old material are rather quiet. Foundry and steel mill takings are considerable. Yard stocks have been reduced. Prices are firm, with slight advances in steel and wrought. We quote, per gross ton, f.o.b. dealers' yards, Birmingham, as follows:

Old steel axles.....	\$18.00 to \$19.00
Old steel rails.....	14.00 to 14.50
No. 1 steel scrap.....	11.25 to 11.75
No. 1 wrought scrap.....	14.50 to 15.00
No. 1 cast scrap.....	11.00 to 11.50
Heavy cast scrap.....	10.50 to 11.00
Stoveplate and light.....	10.00 to 10.50
Old carwheels.....	12.00 to 12.50
Tram carwheels.....	10.00 to 10.50



Maryland Railroad, 1000 tons from Norfolk & Western, 1000 tons from Bay State Railway, 550 tons from the Trenton & Mercer County Traction Company, 1000 tons from the Public Service Railway Company of New Jersey, 1500 tons from the Philadelphia Rapid Transit Company, and 500 tons from the Canton Railroad. All are for T-rails, except 1000 tons for the Philadelphia Rapid Transit Company.

**Bars.**—The nominal quotation for steel bars continues at 2.909c. The quotation for iron bars is unchanged at 2.659c., Philadelphia, but some makers ask \$2 per ton over this price.

**Structural Material.**—A contract was placed last week with the Belmont Iron Works for 6000 tons required in the construction of the Sun Shipbuilding Company's plant on the Delaware River. The ultimate requirement may be 9000 tons. The Midvale Steel Company is about to place the contract for 3000 tons required for a 3-story machine shop at Nicetown, Philadelphia. The contract has been let for 500 tons required for an addition to the Snellenburg department store, this city. The minimum quotation is unchanged at 3c., Pittsburgh, or 3.159c., Philadelphia, and eastern Pennsylvania mills have more orders than they can conveniently handle. One which has not gone into the fourth quarter could dispense with 20 per cent of the business it has in view and yet keep busy to the end of the year.

**Billets.**—Open-hearth rerolling billets are quoted at \$50 to \$55, but are difficult to obtain. Forging steel is quoted nominally at \$65 to \$70, but more than these figures is asked by some makers. The steel most easily obtained consists of material discarded in making shell rounds.

**Sheets.**—No. 10 blue annealed sheets command 3.909c. to 4.159c., Philadelphia.

**Coke.**—Some interest is shown in contract furnace coke, which is quoted at \$2.80 to \$3 per net ton at oven; spot, \$2.25 to \$2.50. Either contract or spot foundry ranges about \$3.50 to \$3.75 per net ton at oven. Freight rates from the principal producing districts are as follows: Connellsville, \$2.05; Latrobe, \$1.85, and Mountaint, \$1.65.

**Old Material.**—Freight embargoes are in force at Coatesville and Parkesburg, a situation which acts as a deterrent to business. Some mills elsewhere are holding up shipments to avoid demurrage charges. The market is easy. There is an excessive supply of turnings. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania, and taking freight rates from 35c. to \$1.35 per gross ton, are as follows:

No. 1 heavy melting steel.....	\$17.50 to \$18.00
Old steel rails, rerolling.....	19.00 to 20.00
Low phos. heavy melting steel scrap.....	22.50 to 23.25
Old steel axles.....	26.00 to 27.00
Old iron axles.....	28.00 to 29.00
Old iron rails.....	20.00 to 20.50
Old carwheels.....	17.00 to 17.50
No. 1 railroad wrought.....	23.00 to 23.50
Wrought-iron pipe.....	14.50 to 15.00
No. 1 forge fire.....	15.00 to 15.50
Bundled sheets.....	15.00 to 15.50
No. 2 busheling.....	11.00 to 11.50
Machine shop turnings.....	10.00 to 10.50
Cast borings.....	11.00 to 11.50
No. 1 cast.....	17.50 to 18.00
Grate bars, railroad.....	13.50 to 14.00
Stove plate.....	13.50 to 14.00
Railroad malleable.....	14.50 to 15.00

The three Scandinavian countries, when it was announced that Germany would have to raise the prices of iron exported to them, took joint action and requested the German Steel Works Union, which controls such exports, not to use the new regulations as a means of cancelling or failing to carry out current contracts. Danish engineering firms in the meantime advertised the necessity of raising these prices.

Commenting on the recent statement in THE IRON AGE that Germany produced 129,646 metric tons of steel in electric furnaces last year under war conditions, the Snyder Electric Furnace Company writes that if the Snyder electric steel furnaces recently contracted for and those now in operation were suddenly mobilized for war service they would turn out 77,975 tons of steel in 12 months on a 24-hr. basis.

## Cincinnati

CINCINNATI, OHIO, May 3, 1916. (By Wire)

**Pig Iron.**—Disturbed labor conditions have adversely affected the market, and foundry iron contracting is practically at a standstill. Few sales were made in this vicinity last week, and there are no inquiries of consequence. The only general one is for 600 tons of mixed Northern and Southern grades from Jeffersonville, Ind., for last-half shipment. A few sales in central Ohio are reported, but the total tonnage is limited. Southern foundry iron stocks are on the increase, and this, coupled with the small demand at present, undoubtedly retards any advances in prices that were predicted here 30 days ago. Southern No. 2 foundry is unchanged at \$15, Birmingham basis, for second-quarter shipment, but orders for delivery through the third quarter can be placed at the same price. For strictly last-half business \$15.50 is quoted, and this same figure can be inserted in contracts for shipment in the first half of 1917. Northern makers are firm at \$19, Ironton, for this year's shipment, and while the quotation for the first half of next year is \$20, some contracts have been made at \$19. Resale Northern No. 2 foundry at \$18.50 for nearby deliveries is said to be very scarce, but there has not been enough iron sold in this territory lately to justify reporting that this low-priced iron has entirely disappeared. The Ohio silvery irons are still quoted at \$29, furnace, for 8 per cent silicon, but this price has not yet been firmly established. Based on freight rates of \$2.90 from Birmingham and \$1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft.....	\$18.40 to \$18.90
Southern coke, No. 2 f'dry and 2 soft.....	17.90 to 18.40
Southern coke, No. 3 foundry.....	17.40 to 17.90
Southern No. 4 foundry.....	16.90 to 17.40
Southern gray forge.....	16.40 to 16.90
Ohio silvery, 8 per cent silicon.....	28.26 to 28.76
Southern Ohio coke, No. 1.....	21.26
Southern Ohio coke, No. 2.....	20.26
Southern Ohio coke, No. 3.....	19.76
Southern Ohio malleable Bessemer.....	20.26
Basic, Northern.....	20.26
Lake Superior charcoal.....	21.20 to 22.20
Standard Southern carwheel.....	25.40 to 25.90

(By Mail)

**Finished Material.**—No change in quotations has been made. The local jobbers have sufficient stocks of wire nails on hand to enable them to make the previously quoted price of \$2.65 per keg base. The store price of barb wire is \$3.50 per 100 lb.; plain steel bars, 3.20c.; twisted steel bars, 3.35c.; No. 10 blue annealed sheets, 3.50c.; plates, 3.50c.; small structural shapes, 3.20c. The nearby mills are quoting No. 28 galvanized sheets around 5.15c. to 5.20c., Cincinnati or Newport, Ky., and No. 28 black sheets from 3.15c. to 3.25c.

**Old Material.**—Prices are again sagging and a reduction of 25c. per ton has been made all along the line, although some grades of scrap could probably be bought on a firm offer below the regular listed quotations. The rolling mills are not consuming as much scrap as usual, while offerings are heavier. The minimum figures given below represent what dealers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations are dealers' prices, f.o.b. at yards.

Per Gross Ton	
Bundled sheet scrap.....	\$12.25 to \$12.75
Old iron rails.....	16.25 to 16.75
Relaying rails, 50-lb. and up.....	21.50 to 22.00
Rerolling steel rails.....	15.25 to 15.75
Heavy melting steel scrap.....	14.50 to 15.00
Steel rails for melting.....	13.75 to 14.25

Per Net Ton	
No. 1 railroad wrought.....	\$13.75 to \$14.25
Cast borings.....	6.00 to 6.50
Steel turnings.....	6.00 to 6.50
Railroad cast scrap.....	11.50 to 12.00
No. 1 machinery scrap.....	13.25 to 13.75
Burnt scrap.....	8.25 to 8.75
Iron axles.....	20.00 to 20.50
Locomotive tires (smooth inside).....	17.25 to 17.75
Pipes and flues.....	10.00 to 10.50
Malleable and steel scrap.....	11.25 to 11.75
Railroad tank and sheet scrap.....	9.00 to 9.50

**Coke.**—From \$2.25 to \$2.50 per net ton at oven is quoted for Connellsville prompt shipment, while contract figures range from \$2.50 to \$2.75. Wise County and Pocahontas furnace brands are quoted around \$2.50 to \$3. Foundry coke contracting is light, and prices in the



three fields are from \$3.50 to \$3.75, but the temporary shortage in the Connellsville supply has caused producers to advance to \$3.75 at oven for prompt shipment. The Connellsville labor situation is not satisfactory, but no trouble is experienced now in getting sufficient cars in which to make shipments. New River foundry coke is quoted at \$4 to \$4.25.

## St. Louis

ST. LOUIS, MO., May 1, 1916.

**Pig Iron.**—Transactions have been heaviest in Northern basic iron. The sales recorded were one of 5000 tons and one of 10,000 tons. An inquiry for about 15,000 tons of Southern basic is still in the market. Other sales included one of 500 tons of Lake Superior charcoal iron. An inquiry for 750 tons of No. 2 Southern foundry for 1917 delivery has appeared.

**Coke.**—The delivery situation has not improved and sales have been for small lots. By-product coke of local plants is firm in parallel with Connellsville prices.

**Finished Iron and Steel.**—The chief event of the week was the booking by the American Bridge Company of 4000 tons for the new Statler Hotel in St. Louis. Specifications are beyond the allotments originally contemplated and therefore rather slow at the moment. Fabricators have taken all the material they could get and their yards are therefore in good shape. They report business increasing rapidly. In light rails business is being taken at 1.70c., base, which is a differential of 40c. as compared with Pittsburgh, due to the overloaded condition of the Pittsburgh plants and the relatively easy situation with some Western makers. Movement out of warehouse is brisk and at firm prices. We quote for stock out of warehouse as follows: Structural material, 3.15c.; soft steel bars, 3.15c.; iron bars, 3.10c.; tank plate, 3.55c.; No. 10 blue annealed sheets, 3.45c.; No. 28 black sheets, cold rolled, one pass, 3.30c.; No. 28 galvanized sheets, black sheet gage, 5.60c.

**Old Material.**—Scrap softened materially in the week, but as no sales of consequence were made the quotations presented are for the most part nominal. The embargoes of the mills are largely responsible for the situation coupled with the heavy quantities of railroad material recently thrown on the market with another series of offerings expected this week. Rejections are reported the severest in many years and dealers are having considerable difficulty in consequence. At the same time mills and foundries are working at a sharp pace with the inevitable consequence of heavy reductions of stocks of material on hand. Lists out during the week include one of 2300 tons from the Vandalia, one of 200 tons from the Standard Oil Company and one of 200 tons from the St. Joseph & Grand Island. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district, as follows:

Per Gross Ton	
Old iron rails.....	\$17.00 to \$17.50
Old steel rails, re-rolling.....	17.00 to 17.50
Old steel rails, less than 3 ft.....	16.50 to 17.00
Relaying rails, standard section, subject to inspection.....	22.00 to 23.00
Old carwheels.....	12.75 to 13.25
No. 1 railroad heavy melting steel scrap.....	15.50 to 15.75
Heavy shoveling steel.....	13.25 to 13.50
Frogs, switches and guards cut apart.....	15.25 to 15.50
Bundled sheet scrap.....	9.00 to 9.25

Per Net Ton	
Iron angle bars.....	\$16.00 to \$16.50
Steel angle bars.....	13.50 to 14.00
Iron car axles.....	23.50 to 24.00
Steel car axles.....	25.50 to 26.00
Wrought arch bars and transoms.....	19.25 to 19.75
No. 1 railroad wrought.....	16.00 to 16.25
No. 2 railroad wrought.....	15.50 to 15.75
Railroad springs.....	14.75 to 15.00
Steel couplers and knuckles.....	14.25 to 14.50
Locomotive tires, 42 in. and over, smooth inside.....	18.75 to 19.25
No. 1 dealers' forge.....	12.00 to 12.50
Cast borings.....	8.00 to 8.25
No. 1 busheling.....	13.50 to 14.00
No. 1 boilers, cut to sheets and rings.....	9.25 to 9.75
No. 1 railroad cast scrap.....	12.00 to 12.50
Stove plate and light cast scrap.....	9.00 to 9.50
Railroad malleable.....	11.25 to 11.75
Agricultural malleable.....	10.25 to 10.75
Pipes and flues.....	10.50 to 11.00
Heavy railroad sheet and tank scrap.....	9.75 to 10.25
Railroad grate bars.....	9.00 to 9.50
Machine shop turnings.....	8.50 to 8.75

## Birmingham

BIRMINGHAM, ALA., May 1, 1916.

**Pig Iron.**—Birmingham pig iron is more uniformly on the basis of \$15 for spot and \$15.50 for second half than in some time. A lot of 400 tons for May delivery brought \$15.50 and 1000 tons of high silicon Clifton brought \$18. Orders coming in recently have been mostly from regular customers who are taken care of at prevailing rates. The volume of transactions is small, but inquiries, especially from the Middle West, are frequent. Dickering for 1917 delivery has not materialized in orders. Business could be done on a basis of \$16 for first half with most dealers. No large sale is reported, but some indications of buyers reappearing are seen. Resale iron is believed to be going fractionally under the market, but furnace interests are not cutting under. The most encouraging feature is the readiness with which consumers are taking their iron. One large interest reports many of them as anticipating delivery and another reports deliveries due during the coming month as twice the make. The car shortage, while not acute, is spasmodically bad, first on one road and then another. Altogether, delayed shipments considerably hamper movements from yards. One maker is of the opinion that the enormous use of scrap in foundry and mill mixtures has been responsible for the absence of some iron orders that would otherwise have been given. High-priced pig iron led to the use of scrap in quarters not heretofore heard from in that connection. The foundry business of the South, especially in the Birmingham district and in the Southwest, has picked up considerably. The general position of Southern furnace interests is to accept the present high profits and wait the turn without anxiety. There may be an increase in output by June 1. The second Vanderbilt stack expects to go in at that time and the Sloss-Sheffield Company will blow in a second City stack about the same time, or as soon as coke can be secured from the Coalburg beehive ovens now under repair. We quote, per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 1 foundry and soft.....	\$15.50 to \$16.00
No. 2 foundry and soft.....	15.00 to 15.50
No. 3 foundry.....	14.50 to 15.00
No. 4 foundry.....	14.25 to 14.75
Gray forge.....	14.00 to 14.50
Basic.....	15.00 to 15.50
Charcoal.....	22.50 to 23.00

**Cast-Iron Pipe.**—It has been an uneventful week in the pipe market, but prices are firm at the recent advances. Wiley Alford and A. M. Shook, Jr., of Birmingham, and A. H. Campbell of Gadsden, have organized the National Pipe & Foundry Company and will build a soil pipe plant at Gadsden to be operated by hydroelectricity, furnished by the Alabama Power Company. We quote, per net ton, f.o.b. pipe shop yards as follows: 4-in., \$29; 6-in. and upward, \$26, with \$1 per net ton added for gas pipe and 16-ft. lengths.

**Coal and Coke.**—Domestic coal is dull, owing to the season. Steam coal is picking up slightly, with the prospect of renewal of orders by large consumers and yard stocking. Coke is very firm at \$4.50 per net ton at oven, for handpicked Yolande, Brookwood and other standard beehive foundry, with furnace coke selling at \$3.20 to \$3.40. Foundry coke is scarce and the demand is brisk.

**Old Material.**—Steel and wrought-iron scrap continue active, but other grades of old material are rather quiet. Foundry and steel mill takings are considerable. Yard stocks have been reduced. Prices are firm, with slight advances in steel and wrought. We quote, per gross ton, f.o.b. dealers' yards, Birmingham, as follows:

Old steel axles.....	\$18.00 to \$19.00
Old steel rails.....	14.00 to 14.50
No. 1 steel scrap.....	11.25 to 11.75
No. 1 wrought scrap.....	14.50 to 15.00
No. 1 cast scrap.....	11.00 to 11.50
Heavy cast scrap.....	10.50 to 11.00
Stoveplate and light.....	10.00 to 10.50
Old carwheels.....	12.00 to 12.50
Tram carwheels.....	10.00 to 10.50

## Buffalo

BUFFALO, N. Y., May 2, 1916.

**Pig Iron.**—Sales for the week aggregated between 35,000 and 40,000 tons of all grades. It appears from later developments that the transactions of a week ago reached 125,000 tons instead of between 80,000 to 90,000 tons, as reported, making the sales for the furnaces of this district in the past two weeks approximately 165,000 tons. These large bookings more clearly emphasize the approaching scarcity of available iron over the remainder of the year from the local producing interests. There are also remaining in the market inquiries for about 10,000 tons. Prices remain practically the same as a week ago. One or two interests have stiffened to a minimum of \$19 for any grade, but it is reported that others, during the heavy buying movement, have shaded their schedules slightly in the competition for attractive tonnages. We quote as follows for current and last half delivery, f.o.b. furnace, Buffalo:

No. 1 foundry .....	\$19.50 to \$20.00
No. 2 X foundry .....	19.00 to 19.50
No. 2 plain .....	18.75 to 19.00
No. 3 foundry .....	18.75 to 19.00
Gray forge .....	18.50 to 19.00
Malleable .....	19.00 to 20.00
Basic .....	19.50 to 20.00
Bessemer .....	21.00 to 22.00

**Finished Iron and Steel.**—Most of the mills and agencies report they are sold up for the remainder of the year and that further business will have to go over into 1917 for deliveries. Many sales offices say that the amount on which they declined to quote during the month of April was larger than the total tonnage booked. This, of course, does not take into consideration specifications against contracts. Warehouse prices were advanced May 1 \$3 per ton on bars and shapes, going to 3.35c., base; also an advance of 25c. per 100 lb. on rounds and squares 2 in. and over, making the new price 4.20c. Plates are now being quoted at 4.15c. All take 5c. extra on the above quotations for store door delivery. The George Kellogg Structural Steel Company, Buffalo, has the contract for 150 tons of shapes for a theater and store building at Olean. Smith & Caffery, Syracuse, have the contract for the structural steel for Syracuse University, agricultural college building, about 300 tons, and the Williams Bridge Company the contract for a small lot for a foundry building for the Syracuse Malleable Iron Works.

**Old Material.**—Sales in all lines have been light. Inquiries, however, are coming in for some large-sized quantities, particularly for heavy melting steel, turnings and borings. It is the general opinion of the trade that the market is going back to the active conditions experienced a few weeks ago and is only awaiting the placing of some of the orders for which urgent inquiries are now before the market. Machine shop turnings have declined 50c. per ton, but dealers believe this will be only temporary, as it is caused by an embargo at the principal consuming point, which it is expected will be lifted in a short time. The demand for old carwheels is light and the price has softened slightly. We quote dealers' asking prices, per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel .....	\$17.50 to \$18.00
Low phosphorus steel .....	21.00 to 21.50
No. 1 railroad wrought scrap .....	19.00 to 19.50
No. 1 railroad and machinery cast scrap .....	16.00 to 16.50
Old steel axles .....	24.00 to 24.50
Old iron axles .....	24.00 to 24.50
Old carwheels .....	15.00 to 15.50
Railroad malleable .....	16.00 to 16.50
Machine shop turnings .....	8.00 to 8.50
Heavy axle turnings .....	12.50 to 13.00
Clean cast borings .....	9.25 to 9.75
Old iron rails .....	18.00 to 18.50
Locomotive grate bars .....	12.00 to 12.50
Stove plate (net ton) .....	11.50 to 12.00
Wrought pipe .....	14.00 to 14.50
Bundled sheet scrap .....	13.00 to 13.50
No. 1 busheling .....	15.00 to 15.50
No. 2 busheling .....	12.00 to 12.50
Bundled tin scrap .....	15.00 to 15.50

David McLain, Goldsmith Building, Milwaukee, Wis., has taken the contract for installing a 2-ton open-hearth furnace in the plant of the Gas Traction Foundry Company, gray-iron and brass castings, Minneapolis, Minn. The unit is designed to produce five heats, or 10 tons, in 12 hr.

## Cleveland

CLEVELAND, OHIO, May 2, 1916.

**Iron Ore.**—Prices for 1917 will be advanced over those of the present year, in the opinion of ore men, who believe that this expected advance will cause some buying later in the season, of ore to be carried over until next spring. However, consumers will be unable to contract for much additional ore this year, as boats will not be available to bring it down. Ore shipments from the head of the lakes are coming rather slowly because boats are being delayed by ice at the Soo and in White Fish Bay. The movement to the Ashland docks is being interfered with by a car shortage. We quote prices as follows, delivered lower Lake ports: Old range Bessemer, \$4.45; Mesaba Bessemer, \$4.20; old range non-Bessemer, \$3.70; Mesaba non-Bessemer, \$3.55.

**Pig Iron.**—One Cleveland consumer has taken 5000 tons of foundry iron and another 2000 tons, both for last half delivery. Otherwise little business is reported in this territory. Prices are unchanged at \$18.50 for outside shipment and \$19 at furnace for Cleveland delivery for No. 2, although one interest is quoting \$19.50 at furnace. The usual Valley quotation is \$18.75. Buffalo furnaces have taken some business in Erie, Pa., at \$19 for No. 2 X for first half of next year. The Southern iron market is not firm. One important interest has opened its books for first half contracts at \$15.50, Birmingham, for No. 2 but some business is being taken in this territory at \$16 for that delivery. Prompt shipment Southern iron can still be had at \$15, Birmingham. Ohio silvery iron is firm at \$29 but the recent advance in prices has caused consumers to withhold orders. We quote, delivered Cleveland, as follows:

Bessemer .....	\$21.95 to \$22.45
Basic .....	\$19.00 to \$19.30
Northern No. 2 foundry .....	19.30 to 19.80
Southern No. 2 foundry .....	19.00 to 19.50
Gray forge .....	18.75
Jackson Co. silvery, 8 per cent silicon .....	30.62
Standard low phos., Valley furnace .....	32.00

**Coke.**—Shipments on contracts are better than they have been so that there is practically no call for foundry coke for prompt shipment. As foundries generally are under contract, the market is very dull. The weakness in furnace coke has not affected foundry grades. We quote standard Connellsville foundry coke at \$3.50 per net ton, at oven, for delivery during 12 months from July 1, and \$3.50 to \$3.75 for prompt shipment and last half. Furnace coke is held at about \$2.25 for prompt shipment.

**Finished Iron and Steel.**—The new demand is not active but consumers are crowding the mills as hard as ever for deliveries and the production of some of the manufacturing plants is being curtailed by slow deliveries of steel. The shortage of labor is having the effect of restricting the output of some of the steel plants. High prices are affecting the volume of building work, and new inquiry for structural material is light. The demand for plates is heavy and a local mill is taking contracts for third quarter at 4c. to 4.50c., Pittsburgh. Representatives of a Japanese shipbuilding company were in the city during the week looking for steel to complete several boats, the original contract for the material having been placed in England. They are understood to have placed some angles and rivets in Cleveland and to have gone East in search of plates. A Youngstown consumer is figuring on orders for high explosive shells that will require 44,200 tons of billets. Two Ohio traction lines have inquiries out for about 1500 tons of rails. The hard steel bar market is irregular. A Western mill is quoting 2.25c., or about 2.47c. delivered in Ohio territory, for last half contracts but a lower price is being named by an Ohio mill. A Pittsburgh district mill has advanced its price on hard steel bars to 2.95c., Pittsburgh. We quote iron bars at 2.50c., Cleveland. Railroad splice bars have been advanced from 1.50c. to 2c., Pittsburgh. The demand for black sheets of heavy gage and blue annealed sheets is very active and the available supply is limited. Roofing sheets are moving slowly. We quote black sheets at 3c. to 3.15c., Ohio mill, for No. 28; blue an-



nealed sheets, 3c. to 3.10c. for No. 10; galvanized, 5c. to 3.15c. for No. 28. Warehouse prices are unchanged at 3.25c. for steel bars and structural material; 3.65c. for plates and 3.20c. for iron bars.

**Bolts, Nuts and Rivets.**—Contracts for bolts and nuts for the last half are being closed at the recent advance in price with large consumers, including railroads, implement makers and automobile builders. Makers are getting further behind on deliveries and some cannot take orders for small bolts or semi-finished nuts for shipment within five or six months. As a result some manufacturers are depending on hardware jobbers for their current needs, orders up to carload lots being placed with local jobbing houses. The demand for rivets continues heavy. Some contract business has been taken for boiler rivets at 4.10c., Pittsburgh, for the fourth quarter. For delivery through the third quarter we quote 3.75c., Pittsburgh, for structural and 3.85c. for boiler rivets for carload lots. Bolt and nut discounts are as follows:

Common carriage bolts,  $\frac{3}{4}$  x 6 in., smaller or shorter, rolled thread, 50, 10 and 5; cut thread, 50 and 5; larger or longer, 40 and 5; machine bolts with h. p. nuts,  $\frac{3}{4}$  x 4 in., smaller and shorter, rolled thread, 50, 10 and 10; cut thread, 50 and 10; larger and longer, 40, 10 and 5; lag bolts, gimlet or cone point, 60; square h. p. nuts, blank or tapped, \$2.90 off the list; hexagon, h. p. nuts, blank or tapped, \$2.90 off; c. p. c. and t. square nuts, blank or tapped, \$2.60; hexagon nuts, all sizes, \$3 off; cold pressed semi-finished hexagon nuts, all sizes, 60 and 10.

**Old Material.**—The market is very dull and prices continue to decline. Some orders have been booked for June and July delivery but sales are mostly in small lots that mills are able to pick up at attractive prices. Heavy melting steel has been sold for \$16.75 for July delivery in Youngstown. Some of the mills that are rolling war steel are producing more scrap than usual, so that they are taking very little from the market. Stocks in local dealers' yards are very heavy. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton	
Old steel rails	\$16.50
Old iron rails	19.00
Steel car axles	26.00
Heavy melting steel	\$16.50 to 16.75
Old carwheels	13.50 to 13.75
Relaying rails, 50 lb. and over	22.50
Agricultural malleable	14.00 to 14.25
Railroad malleable	17.00 to 17.25
Steel axle turnings	13.00 to 13.25
Light bundled sheet scrap	13.00 to 13.75

Per Net Ton	
Iron car axles	\$23.00 to \$24.00
Cast borings	7.50 to 7.75
Iron and steel turnings and drillings	7.50 to 7.75
No. 1 busheling	14.00 to 14.50
No. 1 railroad wrought	17.00 to 17.50
No. 1 cast	14.00 to 14.50
Railroad grate bars	11.75 to 12.00
Stove plate	11.25 to 11.50

## San Francisco

SAN FRANCISCO, CAL., April 25, 1916.

New business for special purposes continues fairly active, but the principal requirements of the regular trade have been covered by contracts for some time ahead, and little new inquiry is coming from such sources, although specifications on contracts are unusually large. Distributive business continues well above last year, with indications favorable for further expansion. Especially encouraging is the marked expansion of various iron and steel consuming industries, which apparently indicate a permanent increase in the local trade. Export inquiries are numerous, but the tonnage actually sold is not heavy, and great difficulty is experienced in delivering steel already sold in the Orient.

**Bars.**—Mills on this coast have so far taken care of the situation fairly well, making better deliveries than most outside interests, though deliveries from all sources are very slow. The demand for concrete reinforcing material is coming out more strongly than last year, with several projects requiring heavy tonnage. The small consuming trade also continues to buy more heavily than usual, and the larger manufacturing interests are sending in liberal specifications. The jobbing price is firmly held at 4c., with prices on large lots from mill varying greatly according to delivery.

**Structural Material.**—Contracts of importance are a

little slow in closing, but a fair tonnage has been booked of late, and new inquiries continue numerous. Dyer Brothers have a 600-ton contract for a building at Second and Market Streets, and the California Steel Company will fabricate about 650 tons for the Jurgens Building, Oakland. Plans are out for a three-story office building and a one-story power house for the Ghirardelli chocolate works, this city. The Northern Electric Railway is taking figures on a bridge requiring about 300 tons, and plans are out for a 300-ton bridge at Modesto, Cal., and for some Government towers at Keyport, Wash. The city of Los Angeles has taken bids for 200 tons for a power house. General industrial requirements continue heavy, and fabricators find difficulty in keeping the desired assortments.

**Rails.**—Small orders for light rails and industrial track are running into a very satisfactory tonnage, though relaying rails are being substituted for new material wherever they can be had. Orders for heavy rails are increasing, though seldom individually large, and some mills are beginning to show reluctance to accept small business in this line.

**Plates.**—The plate tonnage continues very heavy, especially at San Francisco and Seattle, where work is being rushed on a large number of ships, and several new contracts have been closed in the last few weeks. Current business consists mostly of specifications on old contracts, although some new orders are going to the mills. The jobbing movement is large, with an active demand from the boiler shops, etc., as well as to meet urgent needs of large consumers. Small lots from store are held at 4.75c. Los Angeles is taking bids for about 21,000 ft. of 36-in. by  $\frac{1}{4}$  and  $\frac{3}{16}$  in. pipe.

**Sheets.**—Galvanized sheets are receiving more attention, though quiet as compared with other lines, a considerable tonnage being urgently needed for building and manufacturing. The jobbing price on No. 28 galvanized is now 6.91c. The demand for blue annealed shows no sign of curtailment, and several large tank and pipe inquiries are appearing. The resale price on blue annealed is 4.75c. The city of San Diego is taking bids for 23,700 ft. of 36-in. pipe.

**Wrought Pipe.**—Oil country business continues exceptionally active, and deliveries on lap-weld are getting steadily farther behind. The tonnage of small pipe also has been fair, but reports differ as to the jobbing movement. The country trade appears fairly active, but local business, according to some reports, has failed to show the usual April revival. This, however, may be due to the fact that consumers bought rather freely before the recent advances. The relative amount of black pipe used is larger than for some years.

**Cast-Iron Pipe.**—Nothing of much importance has appeared of late, but small orders from both municipal and private properties aggregate a satisfactory tonnage. Los Angeles has ordered 200 tons of 20-in., and Pasadena has taken a few cars of 4 to 6 in. Several of the oil companies are buying flanged pipe for refinery work. Prices are quoted at \$36 per net ton for 6-in. and over, \$39 for 4-in., and \$1 extra for class A and gas pipe.

**Pig Iron.**—A few scattering orders for prompt shipment of foundry iron are coming out, but the buying movement seems to have subsided for the present, as arrivals on contracts are about even with current needs, and most melters are covered for the rest of the year. The tonnage melted is the largest in several years, most of the foundries being well occupied. No. 1 Southern foundry iron is still quoted here at about \$27 per gross ton. Some Chinese iron is under contract, but deliveries are retarded by lack of shipping facilities.

**Coke.**—New business shows somewhat less activity, as recent arrivals, together with the coke already under contract, assure ample supplies for the foundry trade for some time to come, and the easiness in some quarters is not encouraging for further purchases. Southern foundry coke is quoted here at about \$16 to \$16.50 per net ton.

**Old Material.**—Cast-iron scrap is moving freely at about the old range of \$14 to \$15 per net ton, with ample supplies. The movement of steel melting scrap is on about the same large scale as for some time, with



prospects of a larger demand within the next few months, and dealers are taking quite a firm view as to values, though \$13 per gross ton is regarded as about the top price, and less desirable offerings are sold as low as \$8.

## New York

NEW YORK, May 3, 1916.

**Pig Iron.**—New England malleable foundries were the most important buyers in the past week, placing several thousand tons with Pennsylvania and New York furnaces, one eastern New York and presumably one Buffalo interest participating. A round tonnage was closed by one New York City buyer also. A number of transactions have been put through where the negotiation in each case was between a single buyer and a single seller, and various inquiries from New Jersey and Hudson River points amount to 2000 to 3000 tons. A feature of the market are filling-in lots and minor contracts for second half. A fair total is represented in the week's sales, though the general aspect is of quietness. A number of furnaces are making wage advances, and May-day demands were presented at several Jersey and eastern Pennsylvania points. Three advances have now been made since fall, amounting in all to 25 to 30 per cent. Some buyers—quite a number, in fact—have yet to provide for their wants after July 1, and furnaces lately reported as well sold for the year have made reservations to an extent for such buying by regular customers. At Buffalo \$19 to \$19.50 for 2X foundry is the basis of some transactions, and prices there are a trifle firmer, though the common asking price was cut on some of the larger recent transactions in the East. New England strikes have caused some holding up of metal. Effective April 28 an embargo was declared by the New Haven road on shipments of pig iron and coke to Waterbury, Hartford and Torrington, Conn. We quote at tidewater for early delivery: No. 1 foundry, \$21 to \$21.25; No. 2X, \$20.50 to \$20.75; No. 2 plain, \$20.25 to \$20.50; Southern iron at tidewater, \$20.75 to \$21 for No. 1 and \$20.25 to \$20.50 for No. 2 foundry and No. 2 soft.

**Ferroalloys.**—The spot market for ferromanganese continues to ease, and although some small lots have been sold the past week at \$400 to \$450, it is believed it can be obtained under \$400. A sale of a few days ago of about 1500 tons of British alloy at \$175, seaboard, for delivery in the first half of 1917, swells the reported total for that delivery to about 22,000 tons. While arrivals from abroad continue at a satisfactory rate, it is believed in some quarters that prices in the last half of 1916 will be higher than those at present, for consumption continues enormous. Representatives of British producers here are now authorized to sell for the last half of 1917 at \$175, seaboard, the prevailing quotation, but there are no inquiries that far ahead. Spiegeleisen is quiet at \$60 to \$65, furnace, for last half of 1916, with a fair-sized inquiry in the market from Canada. Ferro-silicon, 50 per cent, is strong, with sales of small lots at \$91 to \$95, the quotation on contract still remaining at \$83 to \$85, Pittsburgh.

**Structural Material.**—Railroad offerings are conspicuous, but there are many industrial plant propositions under consideration and New York building work looms up so well that the outlook for some time is exceedingly bright. The Pennsylvania has taken bids on 1800 tons of bridge work and the Lehigh Valley has now a total of 3300 tons before the market. The McClintic-Marshall Company is low on the 1750 tons for the two bridges over the Mystic River for the city of Boston and the Boston Elevated Railroad, and the American Bridge Company has closed for 200 tons for the Baltimore & Ohio. One of the largest offerings in the industrial plant field involves 3000 tons for the Midvale Steel Company at Nicetown and in addition to this further building work is to be done at the Worth Brothers plant at Coatesville. Interest is again being shown in 3000 tons of work for the Revere Sugar Refining Company, Boston, and it is understood that the Bush Terminal Company is to erect a pier in Brooklyn

which will take perhaps 750 tons. Three sections of subway work, largely in Brooklyn, will be offered for bids in two weeks involving 13,000 tons. A loft building on South Street, taking about 500 tons, is the latest addition of this type of building, and it is understood that the Harris-Silvers-Baker Company has closed for the 1000-ton Ritz Realty office building at Broadway and Twenty-first Street. The McClintic-Marshall Company has the contract for the Atlantic Refining Company's boiler house, 500 tons, and the Portland, Me., high school, 850 tons. Warehouse prices have been given another advance, this time \$5 after the \$3 advance last week, and shapes out of store are now 3.50c., New York. Mill shipments continue at 2.769c. to 3.169c., New York.

**Steel Plates.**—Requests for plates for shipbuilding purposes continue and in some quarters it is believed that expansion in demand is to be expected for some time on this account. For delivery in a few weeks 3.75c., Pittsburgh, seems still a possibility for an attractive order, while for quick shipment, mills have no difficulty in getting 5c., Pittsburgh. The general run of new business is done at 4c., Pittsburgh basis. Business with the Pittsburgh mills for future delivery appears to be done at 2.75c. to 2.90c. With railroad cars 40 to 50 per cent higher in price than they were a year ago, further instances of abandonment of car buying on account of high price are noted; among these may be mentioned 1000 gondolas for the Missouri Pacific, 150 tank cars for the Imperial Oil Company and some 50 cars for the Ocean Shore Railroad. The French Government has bought 500 more box cars and is expected shortly to place another lot and the Louisville & Nashville has closed for 750 more underframes, these distributed as follows: 200 to the American Car & Foundry Company; 100 to the Mount Vernon Car Mfg. Company and 450 to the Bettendorf Company. The Rock Island is considering 300 center construction; the San Pedro, Los Angeles & Salt Lake is likely to buy 100 to 300 automobile cars; the Wabash 800 to 1000 box car bodies and the Illinois Central 300 cars. We quote plates out of warehouse at 4.50c., New York, an advance of \$5 per ton over the prices ruling a week ago and \$10 over those two weeks ago. Mill shipments may be put at 3.919c. to 5.169c., New York, depending on the urgency and for delivery in three months.

**Iron and Steel Bars.**—Interest is expected to develop before long among manufacturing consumers for contracts for the last half, with the result that another buying movement is not unexpected. Meanwhile store prices have been advanced \$5 per ton and some sales of steel bars out of mill stocks have been made at 3.50c., Pittsburgh. For mill shipment we quote steel bars at 2.769c. to 2.919c., New York, for deferred delivery, and iron bars from mill at 2.669c., New York. From warehouse, iron and steel bars are 3.50c., New York.

**Cast-Iron Pipe.**—The Warren Foundry & Machine Company has been awarded the Lowell contract for 511 tons, the New York City Queens contract for 500 tons and the Newburgh contract for 100 tons. R. D. Wood & Co., secured the New York City Manhattan and Bronx contract for 315 tons. New Bedford, Mass., is expected to be in the market soon for pipe in connection with sewer extension work, and Olean, N. Y., will this week buy 120 tons. While municipal lettings are strikingly few, activity prevails in the buying of pipe by private water and gas companies. Carload lots of 6-in., class B and heavier, are quoted at \$30.50 per net ton, tidewater, class A and gas pipe taking an extra of \$1 per ton.

**Old Material.**—The situation with regard to steel scrap and rolling-mill stock is distinctly unfavorable. Consumers appear to be completely out of the market, and dealers are not disposed to make purchases under such circumstances. While it is known that the consumption of scrap is enormous, the supply is evidently more than enough to meet it. Borings have fallen sharply. Relaying rails, however, continue to be in a class by themselves, being scarce with a strong demand and a tendency to advance. Dealers' views are less hopeful than they have been, and it is possible that the quotations given below would be shaded on active busi-

ness. Brokers are paying about as follows to local dealers and producers, per gross ton, New York:

No. 1 heavy melting steel scrap (railroad or equivalent) .....	\$15.50 to \$15.75
Heavy steel scrap (eastern Pa. specifications) ..	15.00 to 15.25
Relaying rails .....	16.75 to 17.50
Revolving rails .....	16.75 to 17.25
Iron car axles .....	26.50 to 27.00
Steel car axles (for domestic use) .....	27.50 to 28.00
Steel car axles (for export) .....	30.00
No. 1 railroad wrought .....	21.50 to 22.00
Wrought-iron track scrap .....	18.50 to 19.00
No. 1 yard wrought, long .....	17.00 to 17.50
No. 1 yard wrought, short .....	16.00 to 16.50
Light iron .....	6.75 to 7.00
Cast borings (clean) .....	8.25 to 8.50
Machine shop turnings .....	8.25 to 8.50
Mixed borings and turnings .....	8.00 to 8.25
Wrought pipe .....	12.00 to 12.50
Old carwheels .....	16.00 to 16.50
Malleable cast (railroad) .....	12.75 to 13.25

Cast scrap is in less demand than recently, and with a plentiful supply prices are slightly lower. Quotations to consumers are as follows, per gross ton, New York:

No. 1 cast (machinery) .....	\$17.50 to \$18.00
No. 2 cast (heavy) .....	16.00 to 16.50
Stove plate .....	12.00 to 12.50
Locomotive grate bars .....	12.00 to 12.50

## BRITISH STEEL MARKET

### French Inquiry for Steel Blooms—American Billets for Second Half

(By Cable)

LONDON, ENGLAND, May 3, 1916.

Export prices are all nominal, but business has been done in Scotch iron bars at £13 17s. 6d. Tin plates are firm, with makers asking 36s. Welsh sheet bars have sold at £12 10s. for the home trade, while £14 has been bid for export. France is inquiring for steel blooms. American 4-in. billets for July to December delivery have sold at \$63 to \$65, c.i.f.

Benzol, 90 per cent, is quoted at 11½d. per gal., toluol at 2s. 4d. per gal., solvent naphtha at 2s. 2d. per gal. and ammonium sulphate at £16 per ton.

Quotations of some iron and steel products, partly nominal, are as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 36s. against 34s., last week.  
Cleveland pig-iron warrants, 86s. 6d.  
Steel black sheets, No. 28, export f.o.b. Liverpool, £19 15s.  
Hematite pig iron, f.o.b. Tees, about 140s. compared with 138s. a week ago.  
Sheet bars (Welsh) delivered at works in Swansea Valley, £12 10s., against £13 last week.  
Steel bars, export, f.o.b. Clyde, £18 5s.  
Ferromanganese, £35, nominal.  
Ferrosilicon, 50 per cent, c.i.f., £29 compared with £27 a week ago.

### Large British Steel Output in 1915

The British output of steel ingots for 1915, according to statistics just published by the Iron, Steel and Allied Trade Federation, was 8,350,944 gross tons. This is the largest output in the last six years. The production of various grades for the past six years was as follows in gross tons:

	Acid Bessemer.	Basic Bessemer.	Acid Open-hearth.	Basic Open-hearth.	Total.
1910.....	1,138,103	641,012	3,016,830	1,578,536	6,374,481
1911.....	887,767	573,373	3,131,118	1,869,354	6,461,612
1912.....	980,662	541,825	3,365,570	1,908,087	6,795,144
1913.....	1,048,772	551,929	3,811,382	2,251,793	7,663,876
1914.....	797,072	482,444	3,680,848	2,874,749	7,835,113
1915.....	821,408	479,816	4,090,752	2,958,968	8,350,944

The total Bessemer output last year, 1,301,224 tons, was larger than in 1914, but lower than any other recent year, while the open-hearth output of 7,049,720 tons was larger than in any previous year. The production of puddled bars last year was 932,906 tons.

In 1915 61 Bessemer converters and 489 open-hearth furnaces were in operation, and 35 converters and 103 open-hearth furnaces were idle.

A second dividend of 10 per cent, amounting to \$25,420.55, has been declared in favor of creditors of the defunct Milwaukee Motor Company, Milwaukee, Wis.

## Iron and Industrial Stocks

NEW YORK, May 2, 1916.

After a period of weakness on Wednesday morning of last week, due to continued apprehension of trouble with Germany, the Washington situation became more reassuring and prices of securities advanced. This advance has steadily continued from day to day. The labor situation is regarded with some anxiety, but adjustments of differences with workmen are steadily being made, even in instances which seemed almost hopeless, and confidence is growing that difficulties of this character will be minimized. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com. 25¼ - 28½	Ry. Steel Spring, com. 35¼ - 37½
Allis-Chal., pref. 73½ - 78½	Ry. Steel Spring, pref. 97
Am. Can. com. 55¼ - 58¾	Republic, com. 44¼ - 48¾
Am. Can. pref. 110 - 111	Republic, pref. 107¼ - 108¾
Am. Car & Fdy., com. 57 - 63	Sloss, com. 50 - 53¼
Am. Car & Fdy., pref. 116 - 116½	Pipe, com. 19½ - 20¾
Am. Loco., com. 66¼ - 74½	U. S. Steel, com. 82¼ - 84¼
Am. Loco., pref. 101¼ - 102	U. S. Steel, pref. 115¼ - 116¾
Am. Steel Fdries. 46 - 49¾	Va. I. C. & Coke. 48 - 52¼
Bald. Loco., com. 83¼ - 92½	Westing. Elec. 56¾ - 59
Bald. Loco., pref. 109	Am. Rad., com. 393 - 395
Beth. Steel, com. 435 - 462	Am. Ship, com. 42 - 45
Beth. Steel, pref. 135	Am. Ship, pref. 88 - 88½
Colorado Fuel. 40½ - 43¾	Chic. Pneu. Tool. 69¾ - 75¾
Deere & Co., pref. 93 - 93½	Lake Sup. Corp. 9 - 9¾
Gen. Elec. 161 - 164	Pa. Steel, com. 78 - 80
Gt. No. Ore Cert. 38¾ - 40¾	Pa. Steel, pref. 98
Int. Harv. of N. J., com. 111¼ - 114¼	Warwick 10½
Int. Harv. Corp., com. 72¾ - 73	Cruc. Stl., com. 78¾ - 85
Int. Harv. Corp., pref. 104¾	Cruc. Steel, pref. 114¼ - 115
Lacka. Steel. 67¼ - 71	Harb-Walk. Refrac., pref. 103
Nat. En. & Stm., com. 22 - 24	La Belle Iron, com. 52 - 53¼
N. Y. Air Brake. 127 - 138	La Belle Iron, pref. 128¾
Pitts. Steel, pref. 98¾ - 98¾	Am. Brit. Mfg., com. 22 - 23
Pressed Stl., com. 45½ - 48¼	Driggs-Seabury. 135 - 139
Pressed Stl., pref. 100 - 103¾	Midvale Steel 59½ - 62½

### Dividends

The Pressed Steel Car Company, regular quarterly, 1% per cent on the preferred stock, payable May 24.  
The Pittsburgh Steel Company, regular quarterly, 1% per cent on the preferred stock, payable May 17.  
The Inland Steel Company, regular quarterly, 2 per cent, payable June 1.  
The Yale & Towne Mfg. Company, extra, 5 per cent, payable May 8.  
The Eastern Steel Company, regular quarterly, 1% per cent on the first preferred stock, payable June 15.  
Deere & Co., regular quarterly, 1% per cent on the preferred stock, payable June 1.  
The New Jersey Zinc Company, regular quarterly, 4 per cent, and extra, 5 per cent, payable May 10.

### Decline in British Rail Exports

The British colonial demand for steel rails is decreasing very strikingly. The following data shows the exports of British rails to colonies for January and February for the last three years in gross tons:

Colonies	1916	1915	1914
South Africa .....	131	3,956	20,623
British India .....	4,169	14,563	15,149
Australia .....	317	13,372	35,604
Canada .....	2	2	1
	4,617	31,893	71,477

This is a decrease for the first two months of 1916 of 93.5 per cent from the same period in 1914 and 85.5 per cent from that of 1915. No rails were shipped to Argentina in January or February, 1916. Total British exports of rails in 1915 were only 242,289 gross tons against 500,117 tons in 1913, a decrease of over 51 per cent.

While not officially stated, it is known that the Sloss-Sheffield Steel & Iron Company intends by May 15 to announce its decision to construct at North Birmingham, Ala., near its furnace plant, a battery of over 100 by-product ovens and a benzol works, at a total cost of over \$2,000,000. The new works will be reached by the company's tracks and the products transported to the City and North Birmingham furnaces at lowest cost. A saving of \$2 per ton on iron manufacture is expected.

## Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, effective from April 10, 1916, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c.; Pacific coast, 65c. on plates, structural shapes, iron and steel bars, pipe and boiler tubes, tin plate, nails, spikes and wire. The foregoing rates to the Pacific coast are by rail only.

**Structural Material.**—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees 3 in. and over, 2.50c. to 2.75c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in., on one or both legs.	.10
Angles, 3 in. on one or both legs less than ¼ in. thick, as per steel bar card, Sept. 1, 1909.	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail).	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909.	.20 to .80
Deck beams and bulb angles.	.30
Handrail tees.	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive.	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive.	.50
Cutting to lengths, under 1 ft.	1.55
No charge for cutting to lengths 3 ft. and over.	

**Plates.**—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 2.75c. to 4c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated Feb. 6, 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft. down to the weight of 3/16 in. take the price of 3/16 in.

Allowable overweight, whether plates are ordered to gage or weight, to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras	Cents per lb.
Gages under ¼ in. to and including 3/16 in.	.10
Gages under 3/16 in. to and including No. 8.	.15
Gages under No. 8 to and including No. 9.	.25
Gages under No. 9 to and including No. 10.	.30
Gages under No. 10 to and including No. 12.	.40
Sketches (including straight taper plates), 3 ft. and over.	.10
Complete circles, 3 ft. in diameter and over.	.20
Boiler and flange steel.	.10
"A. B. M. A." and ordinary firebox steel.	.20
Still bottom steel.	.30
Marine steel.	.40
Locomotive firebox steel.	.50
Widths over 100 in. up to 110 in., inclusive.	.05
Widths over 110 in. up to 115 in., inclusive.	.10
Widths over 115 in. up to 120 in., inclusive.	.15
Widths over 120 in. up to 125 in., inclusive.	.25
Widths over 125 in. up to 130 in., inclusive.	.50
Widths over 130 in.	1.00
Cutting to lengths under 3 ft. to 2 ft., inclusive.	.25
Cutting to lengths under 2 ft. to 1 ft., inclusive.	.50
Cutting to lengths under 1 ft.	1.55
No charge for cutting rectangular plates to lengths 3 ft. and over.	

**Wire Rods.**—Bessemer, open-hearth and chain rods, \$60, nominally.

**Wire Products.**—Prices to jobbers, effective May 1: Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, \$2.45; galvanized, \$3.15. Galvanized barb wire and staples, \$3.35; painted, \$2.65. Wire nails, \$2.50. Galvanized nails, 1 in. and longer, \$2 advance over base price; shorter than 1 in., \$2.50 advance over base price. Woven wire fencing, 61½ per cent off list for carloads, 60½ off for 1000-rod lots, 59½ off for less than 1000-rod lots.

The following table gives the price per 100 lb. to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Nos.	0 to 9	10	11	12	12½	13	14	15	16
Annealed	\$2.50	\$2.55	\$2.60	\$2.65	\$2.80	\$2.90	\$3.00	\$3.10	
Galvanized	3.40	3.45	3.50	3.55	3.60	3.75	4.10	4.20	

**Wrought Pipe.**—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect from April 21, 1916, on black and galvanized steel and iron pipe, all full weight.

Steel			Butt Weld			Iron		
Inches	Black	Galv.	Inches	Black	Galv.	Inches	Black	Galv.
½, ¾ and 1	63	30½	1½ and 2	52	19	1½ and 2	52	19
1½	67	46½	2½	53	20	2½	53	20
¾ to 3	70	50½	3½	57	33	3½	57	33
			4½ to 1½	60	38	4½ to 1½	60	38
Lap Weld								
2	65	45½	1½	48	26	1½	48	26
2½ to 6	68	48½	1½	54	33	1½	54	33
7 to 12	65	44½	2	55	34	2	55	34
13 and 14	53½	..	2½ to 4	57	37	2½ to 4	57	37
15	51	..	4½ to 6	57	37	4½ to 6	57	37
			7 to 12	56	36	7 to 12	56	36
Reamed and Drifted								
1 to 3, butt	68	48½	¾ to 1½, butt	55	32	¾ to 1½, butt	55	32
2, lap	63	43½	1½, lap	42	20	1½, lap	42	20
2½ to 6, lap	66	46½	1½, lap	49	27	1½, lap	49	27
			2, lap	50	28	2, lap	50	28
			2½ to 4, lap	52	31	2½ to 4, lap	52	31

Butt Weld, extra strong, plain ends			Butt Weld, extra strong, plain ends		
½, ¾ and 1	59	35½	1½, ¾ and 1	52	29
1½	64	45½	2½	57	38
¾ to 1½	68	49½	¾ to 1½	61	40
2 to 3	69	50½			

Lap Weld, extra strong, plain ends			Lap Weld, extra strong, plain ends		
2	63	44½	1½	50	28
2½ to 4	66	47½	1½	55	34
4½ to 6	65	46½	2	57	37
7 to 8	61	40½	2½ to 4	59	40
9 to 12	56	35½	4½ to 6	58	39
			7 to 8	52	33
			9 to 12	47	28

Butt Weld, double extra strong, plain ends			Butt Weld, double extra strong, plain ends		
½	55	38½	1½	44	26
¾ to 1½	58	41½	¾ to 1½	47	29
2 to 2½	60	43½			

Lap Weld, double extra strong, plain ends			Lap Weld, double extra strong, plain ends		
2	55	38½	1½	44	25
2½ to 4	57	40½	2	44	25
4½ to 6	56	39½	2½ to 4	46	30
7 to 8	51	30½	4½ to 6	45	29

To the large jobbing trade an additional 5 per cent is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

**Sheets.**—Makers' prices for mill shipment on sheets, of U. S. standard gage, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows, f.o.b. Pittsburgh, terms 30 days net, or 2 per cent cash discount in 10 days from date of invoice:

Blue Annealed Sheets		Cents per lb.
Nos. 3 to 8	2.85 to 2.95	
Nos. 9 to 10	2.90 to 3.00	
Nos. 11 and 12	2.95 to 3.05	
Nos. 13 and 14	3.00 to 3.10	
Nos. 15 and 16	3.10 to 3.20	
Above prices are for Bessemer stock. For open-hearth stock \$2 per ton advance is charged.		

Box Annealed Sheets, Cold Rolled		Cents per lb.
Nos. 17 to 21	2.65 to 2.70	
Nos. 22 and 24	2.70 to 2.75	
Nos. 25 and 26	2.75 to 2.80	
No. 27	2.80 to 2.85	
No. 28	2.85 to 2.90	
No. 29	2.90 to 2.95	
No. 30	3.10 to 3.15	
Above prices are for Bessemer stock. For open-hearth stock \$2 per ton advance is charged.		

Galvanized Sheets of Black Sheet Gage		Cents per lb.
Nos. 10 and 11	4.00 to 4.25	
No. 12	4.10 to 4.35	
Nos. 13 and 14	4.10 to 4.35	
Nos. 15 and 16	4.20 to 4.45	
Nos. 17 to 21	4.35 to 4.60	
Nos. 22 and 24	4.55 to 4.80	
Nos. 25 and 26	4.70 to 4.95	
No. 27	4.85 to 5.10	
No. 28	5.00 to 5.25	
No. 29	5.15 to 5.40	
Above prices are for Bessemer stock. For open-hearth stock \$2 per ton advance is charged.		

**Boiler Tubes.**—Discounts on less than carloads, f.o.b. Pittsburgh, freight to destination added, on lap-welded steel tubes and standard charcoal-iron tubes, effective from April 15, 1916, are as follows:

Lap Welded Steel		Standard Charcoal Iron	
1½ in.	.35	1½ in.	.27
1¾ and 2 in.	.47	1¾ and 2 in.	.39
2¼ in.	.44	2¼ in.	.36
2½ and 2¾ in.	.50	2½ and 2¾ in.	.42
3 and 3¼ in.	.55	3 and 3¼ in.	.47
3½ to 4½ in.	.56	3½ to 4½ in.	.48
5 and 6 in.	.49	5 and 6 in.	.41
7 to 13 in.	.46	7 to 13 in.	.38

Locomotive and steamship special charcoal grades bring higher prices.

1½ in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.



## Metal Markets

### The Week's Prices

		Cents Per Pound for Early Delivery						
		Copper, New York	Tin, Electrolytic	New York	Lead, New York	St. Louis	Spelter, New York	St. Louis
April	Lake	29.00	28.50	49.25	7.50	7.37½	18.25	18.00
26	.....	29.00	28.50	49.87½	7.50	7.37½	18.00	17.75
27	.....	29.00	28.50	50.50	7.50	7.37½	17.75	17.50
28	.....	29.00	28.50	.....	7.50	7.37½	17.75	17.50
29	.....	29.00	28.50	.....	7.50	7.37½	17.75	17.50
May	1	29.00	28.50	51.00	7.50	7.37½	17.50	17.25
2	.....	29.00	28.50	52.50	7.50	7.37½	17.50	17.25

NEW YORK, May 3, 1916.

In copper there is a decided lull but quotations remain firm. Tin is higher because of uncertainty as to supply. Lead has been dull but its tone has changed from easy to steady. Spelter, after declining, shows signs of hardening. Antimony is dull and lower.

#### New York

**Copper.**—The market has been extremely quiet, with buying confined to small scattered lots but prices continue strong. There are rumors of large foreign inquiries pending. They may be true, as recent large buying for foreign account was preceded by similar reports. Far futures, that is from September on, are quoted at 28.50c., for electrolytic, while prompt has sold at 30.30c., cash, New York. Lake is unavailable for nearby delivery, and September is quoted at 29c. to 29.50c. cash. The refineries are having trouble in making prompt shipments. They have no actual strike troubles to contend with, but men are hard to obtain and they also have difficulty in getting supplies for their refineries. The London quotation for electrolytic is higher at £145. The exports in April totaled 19,980 tons. Stocks in Great Britain and France are a little larger. They totaled 7223 tons April 30, against 5528 tons March 31.

**Copper Averages.**—The average price of Lake copper for the month of April, based on daily quotations in THE IRON AGE, was 28.26½c. and for electrolytic, 28c.

**Tin.**—Difficulty in getting licenses to ship from London continues the dominating influence of the market. It has reached a point where some of those who are usually sellers are now buyers. A few importers are complaining bitterly over the situation, inasmuch as they have sold futures against which they cannot make deliveries. The situation has created an abnormal market. Throughout the week there has been a fair demand for April, May and June, but sellers were few. Spot tin was sold April 26 at 49.25c., but yesterday the quotation was 52.50c. Last Friday and yesterday there were fair sales, dealers and importers doing most of the buying. The total deliveries into consumption in April amounted to 4202 tons. In stocks and landing April 30 was 2756 tons.

**Lead.**—The situation has been dull and devoid of features except that the tendency toward easiness has given way to one of firmness. The decline in prices was checked at 7.50c., New York, and 7.37½c., St. Louis. Sellers ceased to press for business inasmuch as their activity in that direction did not bring them anything. The exports in April totaled 1372 tons.

**Spelter.**—The market has continued quiet, although late last week it picked up a little. There was rather lively inquiry from the galvanizers for second quarter metal, but with more inquiry than actual business. Yesterday the tone of the market was fairly good at 17.50c., New York, and 17.25c., St. Louis. May was quoted at 17c. to 17.25c., New York; June at about 16.50c.; July at about 16c. and last quarter at about 13.50c. Not much interest is shown in far off positions for the reason that the depressing effect of the Government report on spelter is still felt. The April exports totaled 2211 tons.

**Antimony.**—This metal has held no interest in the past week and prices have declined. For Chinese and Japanese grades 38.50c., duty paid, is quoted for spot,

and concessions from this price are reported but with no results. The shortage is, for the present at least, a thing of the past.

**Aluminum.**—Quotations are unchanged at 58c. to 60c. for No. 1 virgin aluminum, 98 to 99 per cent pure.

**Old Metals.**—Conditions are unchanged. Dealers' selling prices are continued as follows:

	Cents per lb.
Copper, heavy and crucible	27.00 to 28.00
Copper, heavy and wire	26.00 to 27.00
Copper, light and bottoms	23.00 to 24.00
Brass, heavy	16.00 to 16.50
Brass, light	13.50 to 14.00
Heavy machine composition	19.00 to 20.00
No. 1 yellow rod brass turnings	16.00 to 16.50
No. 1 red brass or composition turnings	17.00 to 18.00
Lead, heavy	6.75
Lead, tea	6.25
Zinc	14.00 to 15.00

#### Chicago

MAY 1.—With the exception of copper prices, which are fractionally higher, also of tin, the general trend in the metal market last week was downward. We have revised our prices and quote: Casting copper, 28c. to 28.50c.; Lake copper, 29.75c. to 30.25c.; tin, carloads, 51.50c., and small lots, 53.50c.; lead, 7.375c. to 7.50c.; spelter, 17.50c.; sheet zinc, 25.50c.; Cookson's antimony, 50c.; other grades, 40c. to 42c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 23.50c.; copper bottoms, 21.50c.; copper clips, 22c.; red brass, 18.50c.; yellow brass, 14c.; lead pipe, 6.25c.; zinc, 13c.; pewter, No. 1, 30c.; tinfoil, 35c.; block tin pipe, 40c.

#### St. Louis

MAY 1.—Non-ferrous metals have not been particularly active, though there have been some marked changes in prices. To-day's closing figures are: Lead, 7.75c.; spelter, 19c.; Lake copper, 32c.; electrolytic copper, 31.50c.; tin, 54c.; Asiatic antimony, 43c. In the Joplin ore district there was some recession in prices. Zinc blende ranged from \$85 to \$115 per ton, with the average for the week's sales in the district \$98. Calamine sold at \$70 to \$80, with the week's average \$74. Lead ore sold at \$98 to \$100.50, with the average \$100. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 10c.; heavy yellow brass, 13.50c.; heavy red brass and light copper, 15.50c.; heavy copper and copper wire, 19c.; zinc, 10c.; pewter, 24c.; tinfoil, 35c.; lead, 5.50c.; tea lead, 3.50c.

#### The Welsh Tin-Plate Industry

The Welsh domestic demand for tin plate is said by U. S. Vice-Consul Hamilton C. Claiborne of Swansea, Wales, to have increased 100 per cent in the last 18 months because of a shortage of bottles and glassware and the substitution of tin boxes and cases for packing. There has been difficulty in obtaining tin bars, with resultant high prices. Because of the inability of American exporters to obtain sufficient vessel room, local manufacturers report that competition has been appreciably reduced, resulting in large orders from the Far East. Steel plants have been very busy and more than \$58 a ton has been asked for both Bessemer and open-hearth steel.

Reports presented at the third annual meeting of the Workmen's Compensation Mutual Liability Insurance Company of Wisconsin show that during the last fiscal year upward of 2300 claims were settled for members, and in practically all cases the compensation was received in whole by the employee without any litigation, and the injured employee returned to his work fully satisfied that he had been fairly treated. The company is an association of employers in many lines of industry for mutual protection under the Wisconsin workmen's compensation act.

Refining nickel by a new process is reported as having been discovered in Canada. The claim is that 100 lb. of matte can be converted into 50 lb. of metal in 48 hr. and that the low-grade iron ores of the Laurentian Hills near Ottawa can be used.

## STRIKES AND WAGE ADVANCES

### Pittsburgh in a Turmoil

This week Pittsburgh is in turmoil, due to strikes, and business of all kinds is seriously hampered. Every plant controlled by the Westinghouse interests is shut down, and it is estimated that from 30,000 to 32,000 men are out on strike. The first trouble developed early last week at the plants of the Westinghouse Electric & Mfg. Company at East Pittsburgh, and now the plants of the Westinghouse Air Brake Company at Wilmerding, the Union Switch & Signal Company at Swissvale, the Pittsburgh Meter Company at East Pittsburgh and the R. D. Nuttall Company in Pittsburgh are closed, with little prospect of any early settlement of the trouble. So far as known, there was no serious dissatisfaction among employees of the Air Brake Company, Switch & Signal Company or the other smaller Westinghouse interests, but the factories were closed for fear of an outbreak and perhaps injury to the employees and to the works.

On Tuesday afternoon about 2000 Westinghouse strikers went to the works of the McClintic-Marshall Company at Rankin, Pa., broke down the fences and tried to persuade the men to go on strike. The situation was so serious that the officials of the company closed the entire plant, ordering the men to go home and remain there until sent for. A delegation of Westinghouse strikers also attacked the Edgar Thomson steel works at Bessemer, and there was a serious riot, two of the strikers being killed. Determined efforts are being made by the strikers to bring out the men in other plants.

A strike of machinists has broken out at some of the shops in the Pittsburgh district, but as yet this is not serious. Probably 200 to 300 men went out in some of the smaller shops, demanding an 8-hr. day and \$4 wage minimum, which the employers have refused to grant. As yet the larger machine shops in the Pittsburgh district have not been affected.

It is said that men in the employ of the Electric & Mfg. Company and the Air Brake Company have been making fabulous wages, some of them from \$20 to \$25 per day, these large amounts being earned through bonuses and by piecework. Thousands of the Westinghouse employees did not want to go out on strike, but were forced to do so. How long the plants will remain idle is a question. The men have made demands for shorter hours, an increase in pay and recognition of labor unions, which the officials say they will not grant.

Secretary Wilson, of the United States Department of Labor, has sent Clifton Reeves, of Trenton, N. J., mediation commissioner, to Pittsburgh in an effort to mediate the strike, co-operating with the mediation board of the Department of Labor and Industry of Pennsylvania.

At a meeting of the Manufacturers' Association of Pittsburgh, held in the rooms of the Chamber of Commerce, April 26, a number of additional firms joined the association, and its name was changed to the Employers' Association of Pittsburgh. The new organization will handle wage and labor matters, and is regarded as very strong, its membership being composed of most of the representative manufacturing concerns in the Pittsburgh district.

At midnight, April 30, the motormen and conductors on all the electric street railways in Pittsburgh went out on a strike for higher wages, but this trouble only lasted 36 hours.

PITTSBURGH, May 3.—(By Wire.)—The strikes and labor troubles in Turtle Creek Valley, the district in which the Westinghouse plants are located, and in the Monongahela Valley, in which are the Edgar Thomson steel works and blast furnaces of the Carnegie Steel Company, the Rankin works of the McClintic-Marshall Company and other large plants, have assumed such an aspect that the National Guard of Pennsylvania has been ordered on duty in the strike zone and is now patrolling the affected districts. The riot at the Edgar Thomson works on Tuesday resulted in the death of two

men, the serious injury of ten and slight injuries to about thirty. Plants now closed include the Braddock works of the American Steel & Wire Company, the Braddock Machine & Mfg. Company, the Sterling Steel Foundry Company and others, whose owners did so to protect the lives of their employees. Only part of the Edgar Thomson works was in operation this morning and six of the blast furnaces were banked, with prospects that four more furnaces would follow unless the trouble is quickly settled.

The entire plant of the West Penn Steel Company, Brackenridge, Pa., was shut down yesterday. On Monday, May 1, the company notified its men of an advance of 10 to 15 per cent in wages, but the men said the advance was not large enough and went on strike.

The machinists' strike in this district is getting more serious. Additional shops are involved, and it is now said that close to 5000 machinists are on strike.

The Allegheny County Commissioners have issued a statement that, under the law of the Commonwealth of Pennsylvania, losses by the destruction of property resulting from riot will not fall upon the company or companies whose property is destroyed but upon the taxpayers of Allegheny County. This is the county in which Pittsburgh is located.

It is a notable fact that all the names of the men who were injured at the riots at the Edgar Thomson works, and these include the two men who were killed, indicate they were foreigners. The better class of labor was not involved in the riots, and several leaders of the Westinghouse strikers have issued statements deploring the acts of the mob, for which they say they were in no wise responsible.

### Cincinnati Machinists' Strike Only Fractional

(Special Telegram)

CINCINNATI, OHIO, May 2, 1916.—The refusal of Cincinnati manufacturers to grant the machinists' union's demand for an 8-hr. day and the same pay for 48-hr. work now given for 52½ hr. a week caused a strike May 1 that involves most of the metal-working plants here. A canvass of the shops under strike showed 9380 men at work Monday morning and 1390 who failed to report. This includes the machine-tool shops, but does not include two or three suburban manufacturing plants. Machinists here have been given increases in all shops in the past year in the shape of bonuses, and in some plants these increases figure all the way from 20 to 40 per cent. The poor initial showing made by the union leaders is believed by employers to indicate an early termination of the trouble.

### Youngstown Machinists' Demands

At Youngstown, Ohio, machinists have drawn up demands for an 8-hr. day, with no reduction in pay, and a minimum rate of 50c. per hour. Other demands are as follows: Overtime shall not be compulsory. All overtime to be paid for at the rate of time and one-half and double time for Sundays and holidays—the holidays to be New Year's Day, Washington's Birthday, Decoration Day, Fourth of July, Labor Day, Thanksgiving and Christmas. All machinists, drill-press hands, special machine hands and floor and vise men must be members of the International Association of Machinists. Should it become necessary to reduce forces, the present men shall be retained and reduction made in working hours until hours have reached 32 per week. Should any further reduction become necessary, the forces shall be reduced and the last man employed shall be the first laid off. Laid off men shall be given preference of re-employment, seniority to prevail. The ratio of apprentices to be not more than one to each shop and one to every ten machinists thereafter. These changes of conditions to take effect May 1, 1916.

A strike involving practically all the machine shops in the district is now on, but no estimate of the number of men on strike has been given out. Manufacturing concerns in the Mahoning Valley have issued a public



statement, giving their views on the situation, part of which is as follows:

1. That they believe in equal treatment to all workmen, whether organized or not; that every man in America has the right to work without being compelled to join any union or organization; and likewise, that any employer should have the right to employ any man irrespective of his membership in any organization.

2. Under the present conditions of trade and competition it is impossible to institute the 8-hr. day as it has been demanded in this Valley.

About 1800 employees of the Republic Rubber Company, Youngstown, have struck and the entire plant is idle. Thomas S. Robinson, president of the company, has issued a statement in which he says the company will not submit to the excessive demands of labor, including the closed shop and the 8-hr. day.

It is said there is a plan to demand an 8-hr. day for men employed at the Youngstown blast furnaces and steel works. As yet, however, this demand has not been made.

### New England Labor Conditions

The striking pressmen at the American Graphophone Company, Bridgeport, Conn., have returned to work without winning any concessions and the city is now free from labor troubles.

At a largely attended meeting, April 1, the machinists' union of Bridgeport initiated over 2000 members, bringing its membership to over 5000. At this meeting an announcement was made that there was no labor trouble in prospect as the members of the union were in favor of leaving conditions as they were in the city.

The polishers who were out at the Millers Falls Company, Millers Falls, Mass., have returned, but the machinists are still out.

There has been no change in the situation at the Hendey Machine Company, Torrington, Conn., and the plant is still closed down.

The Eastern Malleable Iron Company, Naugatuck, Conn., has decreased its working schedule from 56 to 54 hr. a week, with a compensating increase in wages.

The Scovill Mfg. Company, Waterbury, Conn., has announced a bonus of 10 per cent on wages earned from Feb. 26 to March 31.

### Bethlehem Steel Co. Advances Wages

Announcement of a wage increase of approximately 10 per cent was made by the Bethlehem Steel Company, April 29. The increase is effective May 1. It affects the employees of the Pennsylvania Steel Company and Maryland Steel Company.

### Other Labor Notes

The Steel Car Forge Company, an interest of the Standard Steel Car Company, Pittsburgh, has notified employees in its works at New Castle, Pa., of an advance in wages of about 10 per cent. Common labor is on the basis of \$2.50 per day.

The Central Iron & Steel Company, Harrisburg, Pa., has posted notices of a general wage increase as follows: Laborers to 19c. an hour and all tonnage and other employees an advance of approximately 2½c. an hour, effective May 1.

The strike at the plant of the Pennsylvania Engineering Works, New Castle, Pa., was settled on Thursday, April 27, the company giving its employees an advance of 3c. per hr., effective from May 1. All departments are now in operation.

The Pittsburgh Steel Company, Pittsburgh, has granted its employees an advance of 10 per cent in wages. Labor employed by this company is now being paid 25c. per hr.

At Chicago and Milwaukee the advent of May has brought few additional labor disturbances to augment those previously inaugurated. The situation at Milwaukee presents no individual instances of importance, although the tension attendant upon the conditions of labor shortage and the high level of finished product prices continues a menace.

A number of molders have walked out from the foundry of the Illinois Malleable Iron Company, Chicago, presumably influenced by the strike at the nearby Harvester plant. The International Harvester Company has announced an increase equivalent to 10-hr. pay at the former rate of 9 hr. work, but the men are also contending for union recognition and the abolishment of the Employees' Benefit Association. The strike at the McCormick and Deering works of the International Harvester Company has grown to the point of including the entire force of the former plant, resulting in its temporary idleness.

The American Iron & Steel Mfg. Company has granted an increase to its employees at Lebanon and Reading, Pa., of from 5 to 10 per cent. This is the second increase within the past few months.

The Logan Iron & Steel Company, Burnham, Pa., will increase the wages of its puddlers from \$5 to \$5.25 per ton on May 8.

A number of the machinists of the William J. Oliver Mfg. Company, Knoxville, Ky., are out. They demand increased wages and shorter hours. The company pays highest wages in the section, according to President W. J. Oliver, conducts an open shop and the men now out may return to work if they wish to at the wages heretofore paid.

Since Jan. 1, the Allis-Chalmers Mfg. Company, Milwaukee, Wis., has put into effect increases in the wages of its shop employees ranging from 10 to 12 per cent, in consideration of improved business conditions. The company followed the plan of checking over the entire working force and making such increases as the merits of each case warranted.

### Franklin Institute Medalists

The Franklin Institute, Philadelphia, at a meeting to be held Wednesday, May 17, at 2.30 p. m., will present the Franklin Medal to Dr. Theodore William Richards, director Wolcott Gibbs Memorial Laboratory, Harvard University, and to John J. Carty, chief engineer American Telephone & Telegraph Company, and the Elliott Cresson Medal to the American Telephone & Telegraph Company, Theodore N. Vail, president.

The Railroad Commission of Wisconsin has dismissed the petition of the Chicago, Milwaukee & St. Paul Railway for permission to increase its industrial switching rates in the Milwaukee terminal district. However, the commission has ordered that the rate for reciprocal switching shall be made 1c. per 100 lb., subject to a minimum weight of 40,000 lb. per car. The rate for switching in the district between industrial tracks and team tracks is fixed at 1½c. per 100 lb., subject to a minimum weight of 55,000 lb. between districts where the industrial minimum is 50,000 lb. and 65,000 lb. in districts where the industrial minimum is 60,000 lb.

The Trumbull Steel Company, Warren, Ohio, has about completed a zinc smelter at Fort Smith, Ark., which will be operated under the name of the Fort Smith Spelter Company, recently incorporated in Ohio with a capital stock of \$350,000. This plant will supply the Trumbull Company with the spelter required in the manufacture of galvanized sheets, leaving some surplus that will be sold to other mills. D. W. Kerr, vice-president of the Trumbull Company, is president of the Fort Smith Spelter Company, and H. S. Buck, who was formerly associated with the Trumbull Company, is vice-president and general manager.

The offices of the Co-operative Used Machinery Company, dealer in second-hand machine tools and metal-working machinery, have been removed from room 553, 50 Church Street, to room 408, 30 Church Street, New York City.

The Wagner Electric Mfg. Company, St. Louis, has removed its Denver office to 1633 Tremont Street, to continue in charge of O. H. Davidson. A stock of motors will be carried at this office.



## PERSONAL

J. V. W. Reynders, who recently resigned as vice-president of the Pennsylvania Steel Company, was tendered a banquet April 29 by members of the Borough Council of Steelton, Pa., of which he was president. He was presented with a silver loving cup by 42 borough officials in appreciation of his work in obtaining for Steelton many important public improvements.

Grenville A. Harris, after 16 years of continuous service with Takata & Co., New York City, has resigned his position as chief engineer and has accepted a similar position with the American Steel Export Company, Woolworth Building, New York City, with entire charge of its newly established engineering and machinery department.

At a meeting of the board of directors of the Yale & Towne Mfg. Company, held April 27, Joseph A. Horne, one of the directors, was elected to the position of second vice-president, retaining also his present position and title of general superintendent. Mr. Horne, who has been over 24 years in the company's service, has the entire management of the works at Stamford, Conn., and of all manufacturing operations of the company, including those of its Canadian plant at St. Catharines, Ont. His election as a vice-president is in recognition of his successful administration in the past, and of the ability which he has shown in discharging the duties of his very responsible position.

Charles Fell, superintendent of the pipe mill of the Lorain plant of the National Tube Company, Lorain, Ohio, has been appointed manager of the plant, succeeding Max M. Suppes, deceased. F. W. Waterman, who has been chief engineer of the Lorain plant for a number of years, and who has acted as manager since the death of Mr. Suppes, has been appointed general manager of the new tube mill, the erection of which the National Tube Company will shortly begin at Gary, Ind. Both appointments went into effect May 1. Mr. Fell has been in the employ of the National Tube Company many years, going to Lorain from McKeesport, Pa., in 1903. He started with the company in a minor capacity and successive promotions have brought him to his present position. Mr. Waterman went to Lorain in 1897 as chief engineer of the Johnson Company and had charge of the construction work of the original plant and various extensions that have since been made. He became chief engineer of the Dominion Iron & Steel Company in 1900, but returned to the Lorain plant two years later.

J. L. Adams, who has been sales representative of the Cambria Steel Company, at Cincinnati, Ohio, nearly 23 years, has been appointed manager of sales of the Cambria Steel Company, Midvale Steel Company and Worth Brothers Company.

Alonzo G. Kinyon, superintendent of locomotive operation on the Seaboard Air Line for a number of years, has resigned this position to become chief consultant in power generation in steam locomotives for the Powdered Coal Engineering & Equipment Company, Chicago.

John H. Guess, secretary and treasurer Lima Locomotive Corporation, Lima, Ohio, has resigned. The vacancy has not yet been filled.

Alfred Reeke, president Reeke-Osmond Motor Car Company, Milwaukee, Wis., has been appointed general sales manager of the Thomas B. Jeffery Company, Kenosha, Wis., manufacturing pleasure and commercial cars. Mr. Reeke assumes the duties of Edward S. Jordan, who resigned several months ago to become head of the Jordan Motor Car Company, Cleveland, Ohio.

Henry Cave, president Cave Welding & Mfg. Company, will hereafter be directly associated with the Davis-Bournonville Company, in active charge of its research department, at the general offices in Jersey City, N. J. He will, however, retain his interest in, and

act in an advisory capacity to the first-named company. To enable Mr. Cave to do this, the Davis-Bournonville Company has arranged to take over the sale of its apparatus in New England, extending to that territory co-operative service, from manufacturer to customer direct. Sales offices will be established in Boston and other New England cities, for the greater convenience of customers. The Cave Welding & Mfg. Company will continue to assist the users of Davis-Bournonville apparatus to the best of its ability. Mr. Cave has been continuously and prominently identified with the oxy-acetylene industry since its introduction in the United States, and his extensive technical and practical experience has given him an authoritative position in the industry.

N. P. Hyndman, sales agent of the Washington Coal & Coke Company, First National Bank Building, Pittsburgh, has gone to California, to be absent until about June 1.

Fred W. McKee, assistant superintendent of the blast furnaces of the Republic Iron & Steel Company at Haselton, Ohio, has been made superintendent of Hall furnace of the company at Sharon, Pa.

L. J. Campbell, assistant to the president, J. A. Campbell, of the Youngstown Sheet & Tube Company, Youngstown, Ohio, returned last week from a vacation spent in Florida.

Press reports from Lebanon, Pa., state that B. Dawson Coleman, resident director of the Pennsylvania Steel Company, recently acquired by the Bethlehem Steel Company, will retire from the board this week and sever his connection with both the company and the Cornwall Ore Banks Company. Mr. Coleman has long been connected with the iron and steel industries of the Lebanon district and still retains his directorship in the American Iron & Steel Mfg. Company.

At a special meeting held last week in Seattle, Wash., the Manufacturers' Association elected William Pigott, Seattle, president. Mr. Pigott is president of the Seattle Car & Foundry Company and also of the Seattle Steel Company.

Henry H. Knapp, whose resignation as assistant treasurer of the Reed-Prentice Company, Worcester, Mass., took effect Jan. 1, recently formed, in company with Worcester and Boston interests, the Universal Export & Import Company, with offices at 49 Federal Street, Boston. Mr. Knapp is the treasurer of the company, which is incorporated under Massachusetts laws to transact a general exporting and importing business and to act as manufacturers' agent. Special attention will be given to Latin-American trade, and when the European war closes the scope of the business will be enlarged to cover all quarters of the globe. One of Mr. Knapp's associates is S. S. Brill, recently special agent of the Department of Commerce, and for many years export manager for American firms in foreign countries.

W. H. McKenna, first vice-president of the Vanadium-Alloys Steel Company, Pittsburgh, recently removed to Boulder, Col., to assist his brother, John A. McKenna, general manager of the Vasco Mining Company, in connection with their tungsten operations in Colorado.

Dr. Johann Puppe, the German authority on questions relating to rolling steel and inventor of a rolling system for wide flange beams, is now director of the Steel and Iron Works at Freistaedt, Austrian Silesia, having recently been taken from the trenches at the war front.

Robert A. McKean, for some years structural engineer for the Jones & Laughlin Steel Company, Pittsburgh, has resigned to accept a similar position with the Riter-Conley Mfg. Company, now owned and operated by the McClintic-Marshall Company, Pittsburgh.

The Burd High Compression Ring Company, Rockford, Ill., announces the appointment of George H. Higgins as factory manager. He goes to the company with an extended experience gained from his former associations with the Stone & Webster Corporation, the Westinghouse Electrical Company, Ford Motor Com-

pany, Buick Motor Company, and Oakland Motor Car Company, and will give special attention to problems involving production.

E. P. Bullard of the Bullard Machine Tool Company was elected vice-president of the Chamber of Commerce of Bridgeport, Conn., April 24. A. H. Bullard was elected a director.

Daniel Gray, formerly with the Henry Vogt Machine Company, is now general foreman of the National Foundry & Machine Company, Louisville, Ky.

Thomas Parkes, formerly manager of the Atlas Machine Company, Nashville, Tenn., purchased recently by the Nashville Machine Company, has joined the mill supply department of the latter company.

Charles A. Rowe, formerly with the Pittsburgh Steel Company at Chicago, has been elected president of the Legauecar & Rowe Engine Company, Chicago. He has been connected with the Pittsburgh Steel Company for the past 11 years, for a time being superintendent at the nail and wire mill in Monessen, Pa.

Henry Souther has resigned as vice-president of the Ferro Machine & Foundry Company, Cleveland, Ohio.

George H. Houston, superintendent Root & Vandervoort Engineering Company, has been identified in a consulting capacity with the American Can Company at New York City.

Ross Anderson, formerly factory superintendent of the Flannery Bolt Company, Bridgeville, Pa., is now factory manager of the Poole Engineering & Machine Company, Baltimore.

Herman Jakobsson, who has been practising patent law and consulting engineering at Washington, D. C., has become identified with the Midvale Steel Company as artillery engineer.

Walter Castanedo has been made district manager at New Orleans for the Ames Iron Works, Oswego, N. Y., with offices in the Hennen Building.

#### Wilmington Employers' Association

With 213 members, including representatives of almost all the industrial establishments of Wilmington, Del., the Wilmington Employers' Association has been organized. The officers are C. D. Garretson, president; John E. Healy and Frederick W. Gawthrop, vice-presidents; C. G. Neese, secretary; George W. Chambers, treasurer. The executive committee consists of Joseph Hamilton, J. E. Walker, Henry M. Taylor, Frank N. Overdeer, Robert Glover, Thomas H. Robbins, Henry F. Mellon, William Shinn and A. P. Neutze. At the first meeting, held at the Hotel DuPont, April 26, resolutions were adopted setting forth the object of the association to be to establish and maintain industrial liberty, justice, peace and mutual understanding in relations of employers and employees; to assist and protect the members in the full and free exercise of the right to employ workmen, irrespective of the membership of such workmen in any labor organization and without regard to the rules, orders or policies of such organization, etc.

#### Cleveland Industrial Association

At the annual meeting of the Industrial Association of Cleveland, Ohio, held April 29, a governing board was elected which includes W. D. Sayle, Cleveland Punch & Shear Works Company; W. B. Greene, Palmer & De Mooy Foundry Company; W. C. Sly, W. W. Sly Mfg. Company; Willard Fuller, Upson Nut Company; William C. Connelly, D. Connelly Boiler Company, and L. H. Kittredge, Peerless Motor Car Company. C. O. Bartlett, president C. O. Bartlett & Snow Company, L. H. Kittredge, W. C. Connelly and others were the speakers. Business men were urged to participate in political affairs in order to receive fair treatment at the hands of legislative bodies. They were told that their side of public questions usually is ignored because of the lack of effective effort to place their views prominently before the people.

## OBITUARY

JAMES DUCKWORTH, head of the Duckworth Chain Company, Springfield, Mass., died at Newport News, Va., April 30, aged 74 years. He was born in Bury, England, and came to this country with his parents when five years old. For many years he was associated with his father at Mount Carmel, Conn., in the manufacture of looms for weaving carpets, etc. He went to Springfield 39 years ago and started a factory for the manufacture of sewing-machine parts. When the bicycle business began to thrive he established the Duckworth Chain Company.

JOHN C. BOLE died at his home in Pittsburgh, April 26. He was at one time a member of the firm of Bole, Ross & Co., dealers in iron and steel scrap, and later was connected with the Shenango Iron & Steel Company, operating a plant at Greenville, Pa., making iron bars. For the last few years he has been president of the John C. Bole Company, handling iron and steel scrap, with offices in the First National Bank Building, Pittsburgh. He leaves his widow and two sons. He was a member of the Duquesne Club.

WILLIAM J. LEDDELL, president Leddell Metal Company, manufacturers of metal alloys, with a factory at Hunters Point, L. I., died April 27 at his home in Summit, N. J., aged 69 years. He was a native of New Jersey and was formerly a member of the firm of Leddell, Bigelow & Co., Elizabeth, N. J. He was in early life a prominent mining expert. He leaves his widow, a son, and a daughter.

ALBERT M. WINGE, shipbuilder, Seattle, Wash., member of the firm of King & Winge, died April 22, aged 48 years. He was one of the ablest factors in the development of Seattle's shipbuilding center.

JOHN S. DONNELLY, general foreman of blast furnaces at the Steelton plant of the Pennsylvania Steel Company, died April 29 from pneumonia, aged 55 years.

JAMES TRUMBULL, secretary and treasurer Connecticut Electric Mfg. Company, Bridgeport, Conn., died at Saranac Lake, N. Y., April 25, aged 35 years.

#### Shop Penalties for Contributory Negligence

One of the employees in the sheet mill of the Youngstown Sheet & Tube Company, who thoughtlessly caused an accident to another employee in his department that resulted in a loss of ten days' time, was given a lay-off of one day for each day the injured man was off work.

One of the employees of the company's mechanical department received a slight scratch that he thought was too insignificant to need medical attention. He reported to the hospital two days after the accident with an infected finger and lost ten days' time because of his failure to observe a rule that every employee is perfectly familiar with. When he was ready to return to work he was told to take a week off and read the company's safety bulletin No. 1 several times each day.

One of the men in the puddle mill had to chip some concrete. He had a pair of goggles in his pocket that had been furnished him to wear when engaged in any work that might endanger his eyes. However, it was deemed fortunate that one of the inspectors found him after he had been at work only a few minutes. He acknowledged he had been told to wear goggles when doing this kind of work, also he took out his goggles from the case he had them in when asked by the inspector if he had goggles. He was given three days' lay-off to think over the chance he took.

The Burd High Compression Ring Company, Rockford, Ill., announces the removal of its Detroit branch from the quarters occupied in the David Whitney Building, for a year or more, to a ground floor location, 578 Woodward Avenue. Walter C. Willard is the manager of this branch.



## Pittsburgh and Nearby Districts

The plant formerly operated by the Clark Steel Hoop Company at Punxsutawney, Pa., in the manufacture of steel hoops and cotton ties, has been taken over by other interests and a new company formed, known as the Punxsutawney Iron & Steel Company, which will manufacture refined iron bars and light steel bands. Actively connected with the new company are William Dakin, R. E. Preble and C. L. Payton.

The Dravo-Doyle Company, Pittsburgh, has been awarded a contract on its bid of \$21,750 for three centrifugal pumps and the necessary motors by the board of control, Youngstown, Ohio, for additions to the filter plant.

The Fort Pitt Rivet Company, Pittsburgh, has been incorporated with a capital of \$30,000 by W. E. Walsh, 1002 Frick Building, J. M. Taylor and J. W. Matterer.

The Buffalo & Lake Erie Traction Company, George Bullock, receiver, Erie, Pa., has awarded general contract to the Henry Shenk Company, Twelfth and Sassafras streets, Erie, for the construction of car barn and shops at Erie from plans of the United Gas & Electric Company, 61 Broadway, New York, at a cost of about \$100,000.

The Arsenal Garage Company, Pittsburgh, with a capital stock of \$30,000, has been incorporated by J. J. Schill, Joseph Fuhrer, Jr., and Orren F. Hartle to manufacture, sell and repair automobiles.

The E. A. Myers Company, Pittsburgh, with a capital stock of \$25,000, has been incorporated by E. A. Myers, 4311 Schenley Farms Terrace, Pittsburgh; W. E. Adams and others, to manufacture automobiles, accessories, etc.

Reports that the Wheeling Steel & Iron Company, Wheeling, W. Va., would erect a new blast furnace are officially denied. Six of the new tin mills being erected by this company at its Yorkville, Ohio, plant will be in operation within the next sixty days.

The Standard Car Construction Company, recently organized at Sharon, Pa., and which has secured for a site the property of the Masurite Explosive Company at Masury, Pa., is going ahead actively with the building of its new plant. Orders for part of the equipment have been placed. The company will build steel tank cars, and has opened offices in the Wright Building, St. Louis, Mo.; DuPont Building, Wilmington, Del., and at 314 Chestnut Street, Philadelphia.

The Pittsburgh Steel Company, Pittsburgh, reports its sales for the nine months ended March 31, 1916, at \$15,760,018.17, against \$7,560,588.40 for the nine months ended March 31, 1915, an increase of \$8,199,429.77. Net profits for the period stated were \$3,185,149.84, against \$291,484.35 for the same period, previous year, or an increase of \$2,893,665.49. The company is operating its works to full capacity and has orders ahead for some months. It has issued a call for payment on June 1 of \$500,000 of its 6 per cent coupon gold notes. There will then remain outstanding only \$2,000,000 of notes, due Jan. 1, 1920, of a total issue of \$5,000,000 on Jan. 1, 1915.

The Evans Mold & Machine Company, Uniontown, Pa., has placed contracts for its new foundry. The main building will be of brick, 40 x 100 ft., fitted with modern equipment. There will be shower baths, wash rooms and lockers for the employees. The company will make steel castings.

The Moltrop Steel Products Company, Beaver Falls, Pa., which is increasing its capital stock from \$100,000 to \$150,000, is understood to be intending to use the additional capital in making additions to its plant.

The F. Tinker & Sons Company, Pittsburgh, with a capital stock of \$5,000, has been incorporated by Francis Tinker, 327 South Atlantic Avenue, Pittsburgh; Uriah Tinker and others, to manufacture hammers, tools, knives, etc.

The Knott & Harker Company, general iron founder, engineer and machinist, Beaver Falls, Pa., lost one of its important buildings, which was totally destroyed by fire on the night of April 21. It was a frame structure, 30 x 80 x 170 ft., two stories, and contained a power plant, pattern shop, stock rooms and shipping department. The loss is estimated at \$20,000. Part of the

power plant was saved, and by using electric power from another plant the delay will not be serious. Machine shop, office buildings and foundry are intact, so that it may be said that all departments are practically in full operation.

The Pittsburgh Game & Novelty Company, Pittsburgh, with a capital stock of \$12,000, has been incorporated by Samuel A. McKelvey, 706 Lang Avenue, Pittsburgh, treasurer; H. H. Hering, W. J. Turner and others, to manufacture toys and novelties from iron, wood and steel.

## American Iron and Steel Institute

At the annual meeting of the American Iron and Steel Institute held in New York, May 1, the following directors were re-elected for the ensuing three years: Edward Bailey, Harrisburg; Joseph G. Butler, Jr., Youngstown, Ohio; E. A. S. Clarke, New York; John A. Topping, New York; William H. Donner, Philadelphia; Willis L. King, Pittsburgh; Samuel Mather, Cleveland. The following were elected associate members at a meeting of directors held April 28:

- Nils Anderson, Debevoise & Anderson, New York.
- Arthur S. Dwight, president Dwight & Lloyd Sintering Company, New York.
- \*George C. Farkell, superintendent rail mill, National Tube Company, Lorain, Ohio.
- \*Frederick E. Fieger, general manager Portsmouth works, Whitaker-Glessner Company, Portsmouth, Ohio.
- John M. Fitzgerald, president Davis Machine Tool Company, Rochester, N. Y.
- S. W. Hobson, surgeon Newport News Shipbuilding & Dry Dock Company, Newport News, Va.
- \*James C. C. Holding, general sales department, Carnegie Steel Company, Pittsburgh.
- \*Malcolm F. McConnell, superintendent Mingo works, Carnegie Steel Company, Mingo Junction, Ohio.
- \*Robert C. Moeller, sales agent American Steel & Wire Company, Worcester, Mass.
- \*William C. Moreland, secretary Jones & Laughlin Steel Company, Pittsburgh.
- James A. Singmaster, general superintendent New Jersey Zinc Company, Palmerton, Pa.
- \*Clinton G. Thomas, president Western Reserve Steel Company, Warren, Ohio.
- \*William J. Thomas, roll designer, Saucon plant, Bethlehem Steel Company, South Bethlehem, Pa.
- Carl Hans Vom Baur, engineer, electric furnace department, Hamilton & Hansell, New York.
- \*Robert A. Walker, resident editor THE IRON AGE, Pittsburgh.
- \*Albert R. Webb, sales agent, American Steel & Wire Company, Worcester, Mass.

\*Placed temporarily on associate list, to be transferred to active list as vacancies occur.

## New Sheet-Mill Plant Proposed

Jacob Waddell has acquired a 36-acre site near the Empire mills, Niles, Ohio, on which will be built a new sheet-mill plant by a company of which he will be the head. The plant will be equipped at the start with six hot mills, while foundations will be provided for two additional hot mills. Galvanizing and other equipment will be installed.

A 2-ton open-hearth furnace, duplicating the unit installed by the Standard Crucible Steel Casting Company, Milwaukee, as mentioned in THE IRON AGE of Jan. 27, has been purchased by the Gas Traction Foundry Company, Minneapolis. David McLain, Milwaukee, is the designer of the furnace.

The Bay Iron Works, Bayfield, Wis., has taken a contract for the manufacture of a new non-leakable valve for high pressure use, designed by Philip Buckley, Washburn, Wis. A large installation will be made at once in the Barksdale plant of the DuPont Powder Company near Washburn.

The Central Iron & Steel Company, Harrisburg, Pa., rolled 216 tons of finished plates on its universal mill in one 12-hr. turn last week—the highest turn record for the mill. The plates are intended for the new bridge over the Ohio River at Louisville, Ky.



## Newark Industrial Exposition

As a part of the celebration of the city's 250th anniversary, an industrial exposition under the direction of the manufacturing and trades committee of the Committee of One Hundred, Newark, N. J., has been arranged at the First Regiment Armory for a period of three weeks beginning Saturday afternoon, May 13, when Secretary of War Baker, representing President Wilson, will deliver the opening address. Over 250 exhibits from 133 distinct lines of industry will be represented. The following manufacturers of iron and steel will show their products:

Gould & Eberhardt—A historical exhibit showing one of their old-style shaping machines, built in 1871, alongside one of their latest type high-duty motor-driven shaping machines in operation on both die and casting work.

Louis Sacks, iron foundry—Gray-iron castings of every description, especially machinery castings.

The Star Fan & Motor Works—Drawn-steel motor-driven fans.

The Universal Caster & Foundry Company—Large-size sample boards showing comprehensive line of furniture casters manufactured.

The C. T. Williamson Wire Novelty Company—Automatic machine for making wire cork screws, in operation.

The Ellis Adding Typewriter Company—Two machines, one a combination adding machine and typewriter or billing machine, and the other a duplex adding machine, both electrically operated.

The J. Wiss & Sons Company—Samples of shears, scissors, tinner snips, razors, etc., in different stages in process of manufacture.

The Phoenix Lock Works—Builders' and marine hardware, cabinet hardware, brass ship locks, butts, hinges, hasps, pulls, hooks, barrel bolts, and chest handles, all to government specifications.

The Driver-Harris Wire Company—Working exhibit of wire machine finishing the small sizes of wire, in addition to samples of regular sized wire, rods, sheet, strips and rope products. The filling of diamond dies for drawing wire will also be shown.

The Newark Leather Machinery Company—Leather-working machinery.

The Sloan & Chase Mfg. Company—Machine tools and machinery, small tools, etc.

The Thatcher Furnace Company—Ranges and boilers.

M. B. Tidey—Box-making machinery.

The Crocker-Wheeler Company—Electrical machinery.

The Westinghouse Electric & Mfg. Company—Electrical machinery.

H. K. & F. S. Benson—Brass ingots, rolls and sheets.

The Central Stamping Company—Tinware.

The Colt Machine & Engineering Company—Sheet-metal machinery.

The Gamon Meter Company—Water Meters.

August Goertz & Co.—Metal novelties.

A. J. Hastings & Co.—Saws and machinery.

The Manufacturers Can Company—Metal containers.

The Newark Wire Cloth Company—Wire cloth.

Newark Gas Engine Company—Gas engines.

## New Shipbuilding Plant at Chester

The Sun Shipbuilding Company, which has recently been organized, will establish one of the most extensive shipbuilding plants in the country at Chester, Pa. Senator W. C. Sproul of Chester is one of the leading movers in the plan. He and associates control Robert Wetherill & Co., Inc., of Chester, whose plants, it is stated, will be greatly enlarged for the construction of marine engines and boilers. The company will be consolidated with the shipbuilding company.

Fifty acres of land on the Delaware River has been acquired and a contract for the construction of the steel frames of the buildings is practically concluded with the Belmont Iron Works, to be fabricated at its bridge works at Eddystone, Pa. Work is to start immediately. The iron-working department will be the main building and will be 480 x 600 ft. Six shipways, each capable of taking care of a 700-ft. vessel, will be constructed. The most modern devices for the work will be installed.

In addition to Senator Sproul, who also heads the Seaboard Steel Casting Company, the others participating in the project are: J. Howard Pew, president of the Sun Company; Joseph N. Pew, Jr., of the same

firm; Gen. T. Coleman DuPont of Wilmington; S. M. Vauclain, vice-president Baldwin Locomotive Works; E. V. Babcock of Pittsburgh, and J. L. Replogle, formerly connected with the Cambria Steel Company.

## New Seamless Tube Mill for Buffalo

The Simplex Seamless Tube Corporation, according to an announcement made by the Buffalo Chamber of Commerce, has been incorporated and will erect a plant in Buffalo, N. Y., for the manufacture of seamless steel tubing. The plant at the outset will have a capacity of 7,000,000 to 10,000,000 lin. ft. per year. Rogers, Locke & Babcock, attorneys for the new corporation, are conducting the arrangements. The plant is to be ready for operation as quickly as possible. The first mill will contain from 8 to 12 benches. Representatives of the company state that contracts have been closed for tubing that will keep the plant busy on a 24-hr. day basis for the next year.

## Enlargement of Warren Foundry

The Warren Foundry & Machine Company, Phillipsburg, N. J., is making extensive improvements in its cast-iron pipe plant. It is erecting a new foundry which will occupy the site of one of the old buildings that dates from the early days of the company's existence. The structure will be of steel and brick, 110 x 220 ft., with a daily capacity of 60 tons of pipe. This will increase the plant capacity about 40 tons a day. The structural steel will be furnished by the Belmont Iron Works, cranes by the Niles-Bement-Pond Company and hoists by the Shepard Electric Crane & Hoist Company.

## Consolidation of Die-Casting Companies

The Doehler Die-Casting Company, Court and Ninth Streets, Brooklyn, N. Y., has acquired a controlling interest in the American Die Casting Company, 39 South Sixth Street, Newark, N. J. While in the future this company will be known as the Doehler Die-Casting Company of New Jersey, there will be no change in the present management. In addition to the original plant at Brooklyn and the recently acquired one in Newark, the company has a third factory at Toledo, Ohio, and maintains a branch sales office in the Ford Building, Detroit, Mich.

The Chicago Machinery Club held its first regular monthly meeting at the Hotel Morrison May 1. Officers elected for the year were: President, C. W. Blakeslee, Abrasive Materials Company; first vice-president, E. P. Welles, C. H. Besly Company; second vice-president, H. A. Stocker, H. A. Stocker Machinery Co.; third vice-president, E. L. Essley, Essley Machinery Company; treasurer, A. L. Beardsley, Cleveland Automatic Machine Company; secretary, D. F. Noble, Harry A. Wheeler, ex-president of the Association of Commerce of the United States, spoke on "Business Organization."

The fourth summer course in scientific management, conducted by Frank B. Gilbreth, 77 Brown Street, Providence, R. I., will be held from July 31 to Aug. 12. The course is open to professors of engineering, business administration and subjects allied to management. There are no fees.

The Robert A. Keasbey Company, manufacturer of pipe covering, packing, etc., has removed from 100 North Moore Street, New York, to Bank and West streets, where it has opened up a warehouse, fitted with the latest type of equipment, enabling quick shipments from stock.

Under the provisions of a bill passed by the Maryland Legislature and signed by the Governor, children under the age of 16 are prohibited from operating machinery run by other than hand or foot power. The law becomes effective June 1.

## TESTING MATERIALS MEETING

### Program of Coming Annual Meeting—Nominations for Officers

A session on the heat treatment of steel will be one of the features of the coming annual meeting of the American Society for Testing Materials. Besides a report of the committee on the subject, Prof. Albert Sauveur, chairman, the following papers are announced: "Heat Treatment of Eutectoid Carbon Steel," by Dr. Henry M. Howe and A. G. Levy; "Recrystallization as a Factor in the Failure of Boiler Tubes," by Prof. Albert E. White, University of Michigan, Ann Arbor, and H. F. Wood, and "Errors in Temperature Measurement," by J. Gerrish Ayers, Jr., metallurgist, Hyatt Roller Bearing Company, Newark, N. J.

The meeting will be held as usual at Atlantic City, N. J., at the Hotel Traymore and will open with a session late on the morning of June 27, a Tuesday also as usual. Instead, however, of having the meeting pass over into Saturday of the same week, the program has been arranged to bring the last session on Friday afternoon, June 30.

A report from the committee on wrought iron, S. V. Hunnings, chemist and engineer of tests, American Locomotive Company, Schenectady, chairman, and the annual report of the executive committee will be made at the first session.

Further committee reports, including those on coke, on coal and on methods of sampling and analysis of coal, will occupy the session opening 3 p. m., June 27.

The heat treatment of steel session convenes at 8 p. m., June 27, and is to be opened by the annual address of the president, Mansfield Merriman, on "The Work of Committees."

A steel and iron session will be held at 10 a. m., June 28, and besides reports of the committees on corrosion and magnetic properties and that of the general steel committee, papers will be presented as follows: "Comparison of Physical Properties Obtained from Carbon Forging Steel When Water and Oil Quenched," by C. D. Young, engineer of tests, Pennsylvania Railroad, Altoona, Pa., and "Standard Specifications," by William R. Webster, civil engineer, Philadelphia.

A session on tests and testing occurs on June 28 at 8 p. m. Besides the committee report and three papers, a topical discussion is announced on the relation between yield point and proportional limit in various grades of steel. J. E. Howard, engineer-physicist, Interstate Commerce Commission, Washington, D. C.; T. D. Lynch, engineer of material tests, Westinghouse Electric & Mfg. Company, East Pittsburgh; Herbert F. Moore, engineering professor of materials, University of Illinois, Urbana, Ill., and F. B. Seely, University of Illinois, are to take part. The papers scheduled are: "Apparatus for Determining Soil Pressure," by Albert T. Goldbeck, engineer of tests, Bureau of Surveys, Philadelphia and E. B. Smith, associate mechanical engineer, Office of Public Roads, Washington, D. C.; "Endurance and Impact Tests of Metals," by D. J. McAdams, Jr., and "Constants and Diagrams for Repeated Stress Calculations," by Prof. H. F. Moore and F. B. Seely.

A session on non-ferrous metals and cast iron will be held on June 30, 10 a. m. The papers scheduled are: "Aluminum Bronze—Some Recent Tests and Their Significance," by W. M. Corse, Titanium Alloy Mfg. Company; "Chemical Composition and Heat Treatment for Brass Condenser Tubes," by A. E. White, University of Michigan, Ann Arbor, and "An Apparatus for Testing the Standard Cast-Iron Arbitration Bar," by H. L. Morse.

In the final session, June 30, 3 p. m., on miscellaneous materials, will be presented the report of the committee on preservative coatings for structural materials, P. H. Walker, Bureau of Standards, Washington, chairman.

#### THE NOMINATIONS FOR OFFICE

A. A. Stevenson, vice-president Standard Steel

Works Company, Philadelphia, has been nominated for president of the society. S. S. Voorhees, engineer-chemist, Bureau of Standards, has been nominated for vice-president to serve two years, and the nominations for members of the executive committee are: W. H. Bassett, chemist, American Brass Company, Waterbury, Conn.; John Brunner, assistant inspecting engineer, Illinois Steel Company, Chicago; G. W. Thompson, chemist, National Lead Company, Brooklyn, N. Y., and F. E. Turneaure, dean of college of mechanics and engineering, University of Wisconsin, Madison, Wis.

The total membership of the Society on April 20 was 1963, a net increase of 121 since June 15, 1915.

## The Electric Furnace in Non-Ferrous Metallurgy

Applications of the electric furnace to non-ferrous metallurgy were surveyed in a paper by Prof. Alfred Stansfield, of Montreal, Canada, presented at the annual general meeting of the Institute of Metals (British) held in London, March 29. Prof. Stansfield said:

The use of electric furnaces in non-ferrous metallurgy is greater in value if not in tons than in the realm of iron and steel, even excluding from both sides the large production of ferrosilicon, chromium, tungsten, etc., which are partly ferrous and partly non-ferrous in character. The production of 80,000 tons of aluminum represents 300,000 e.h.p.; of 200,000 tons of electric steel, 25,000 e.h.p.; of 50,000 tons of electric pig iron, 20,000 e.h.p.; of 5000 tons of sodium, 10,000 e.h.p., and of 2000 tons of silicon, 4000 e.h.p.

The most important application of the electric furnace to non-ferrous metallurgy is for the electrolytic production of metals. Aluminum and sodium are the most notable examples, but potassium, calcium, magnesium, barium, strontium and cerium are also produced in the same way. While it seems probable that the field of electrolysis, even at high temperatures, has already been fairly well explored, there is no doubt considerable room for further development and for the production of many of the less known metals on a large scale, and even a common metal like zinc may be recovered economically by igneous electrolysis.

Electrothermic furnaces are employed for the reduction of metals from their ores. The ores are frequently oxidized, and their reduction is effected in general by the reaction of the oxides and carbon with the aid of electrically generated heat. Compared with fuel-fired furnaces the electric furnace has the advantage that air and the products of combustion of fuels can be completely excluded and that higher temperatures can be obtained. It is therefore especially suitable for the reduction of metals like chromium, tungsten and titanium and the semi-metal silicon.

The electric smelting of zinc ores has held the attention of metallurgists for a long time, and during recent years a large amount of work has been done on the problem of treating, not only the high-grade ores that are easily distilled in the Belgian zinc retort, but also the low-grade and complex ores that can hardly be treated at all by existing methods. In Norway and Sweden the electric smelting of zinc ores has been carried out commercially for some years.

## To Increase Domestic Use of Electricity

A campaign to promote the sales of electric ranges and to build up a domestic load for electric stations in electric cooking is under consideration by the Society for Electrical Development, New York City. It appears that in over 2800 communities a cooking rate of 5c. or lower per kilowatt hour is in existence. Of this number over 70 per cent are 4c. or lower and 27 per cent 3c. or lower. It is felt that the rate must be 4c. or less for the householder to use an electric range. A committee of the society is to meet at Chicago in the afternoon of May 22 to take up in detail the plans for a national electric range campaign. The committee meeting incidentally will precede the convention in Chicago of the National Electric Light Association.



## Book Reviews

**The Metallography and Heat Treatment of Iron and Steel.** By Albert Sauveur. Pages XVI + 486, 7½ x 10¾ in.; illustrations, 436. Published by Sauveur and Boylston, Boston, Mass. Price, \$6.

The rapid advance in knowledge of the application of the microscope to the steel industry and the vital place which heat treatment has assumed have demonstrated to the author the necessity of a revised edition of his earlier book. That there was a demand for such a work has been proved by the sale in less than three years of two impressions of the first edition. The title, originally "The Metallography of Iron and Steel," has been changed since so large a portion of the new work is devoted to the study of the heat treatment of iron and steel.

The revision includes nearly every chapter, and fifty pages of new matter have been added as well as nearly 100 illustrations, while all but sixty-four pages have been entirely reset. The general plan of the first edition has been followed and the character of the chapters is such that the work is excellently adapted for classroom use. The printing, the paper and the illustrations are excellent.

The reputation the author enjoys in this field lends authority to the new book as to its predecessor. It is written in a simple and clear style. Postponing until the closing chapters the discussion of the abstruse subject of the equilibrium diagram and the phase rule is not only in the interest of the untrained reader, about to take up this important subject, but is also justified by the effective results of its application in the last three years as demonstrated by the author's own pupils.

**The Metallurgist's and Chemist's Handbook.** A Reference Book of Tables and Data for the Student and Metallurgist. Compiled by Donald M. Liddell. Pages, 1603, 4 x 6½ in.; illustrated; leather. McGraw-Hill Book Company, Inc., New York. Price, \$4.

Mr. Liddell says in his preface that this book is little more than a collection of tables—those which his own experience and the requests from readers of the *Engineering and Mining Journal* have led him to believe most necessary to the chemist and metallurgist—the reviewer finds considerably more. The tables and data are excellent, especially those giving the composition of numerous alloys. Besides these there are sections on ore dressing, cyanidation, fuels and refractories, mechanical engineering and construction, general metallurgy and first aid. Those dealing with physical constants and chemical data are exceptionally good and complete, and the metallurgical price and production statistics are valuable for reference. Under general metallurgy, electric furnaces are discussed. The volume is one of the best handbooks extant for chemists and metallurgists.

A publication of decided interest to manufacturers and users of volumetric apparatus is "The Testing of Glass Volumetric Apparatus," Circular No. 9, of the U. S. Bureau of Standards. It contains specifications and tolerances for this kind of apparatus, such as burettes, cylindrical graduates, flasks, pipettes, Babcock test bottles and specific gravity flasks. The methods of test are described.

"Standard Density and Volumetric Tables" is the title of Circular No. 19 of the U. S. Bureau of Standards. The density and volumetric tables for certain substances much used in the arts and sciences, such as water, ethyl alcohol, methyl alcohol, sulphuric acid and cane sugar solutions, are presented, as well as tables of data useful in certain physical operations, such as the calibration of hydrometers and volumetric apparatus.

A handy book on tinsmiths' machines and tools has been issued by the Peck, Stow & Wilcox Company, Southington, Conn. The first part of the book is devoted to various kinds of seams and joints and numerous tables of weights and measures. Tables showing

how to ascertain the weight of copper and weight of boxed tin plate are included. Some 250 pages cover information about the operation and construction of metal-working machines and tools. In the introduction of the pocket manual is an illustration of a Pexto burring machine which has been in continuous service for more than eighty years. A copy of the book can undoubtedly be had for the asking.

## San Francisco Industrial Survey

The San Francisco Chamber of Commerce has been working for the past six months through a special committee in preparation for a scientific, unbiased and non-political industrial survey of San Francisco and the Bay region. F. J. Koster, president California Barrel Company, is chairman of the committee, and among those associated with him are the following: George M. Rolph, manager California-Hawaiian Sugar Refining Company; John A. McGregor, president Union Iron Works; Constant Meese, president Meese & Gottfried Company; Adolph Mack, president Imperial Oil Company, and Robert Newton Lynch, vice-president and manager of the Chamber of Commerce.

The sum of \$40,000 has been raised to conduct the survey and additional funds are promised if they are found necessary. The services of Dr. B. M. Rastall have been secured to collaborate the data that the information and statistical department of the chamber has been gathering for the past two years. He is to spend three months on the work, beginning June 1. The Chamber of Commerce is preparing a map of San Francisco on a scale of 100 ft. to 1 in. and there are 27 sections 6 ft. square covering the industrial district of San Francisco alone. A prospective manufacturer can be furnished with information as to the cost, size, rent, taxes, insurance, interest, the owner and other data relative to available factory sites and buildings. For the past year the information and statistical department has been gathering data as to the comparative cost of factory sites, transportation, taxes, insurance, labor, rent, leases, raw materials, light, heat and power in the Pacific coast manufacturing centers.

In 1915 no less than 61 new factories located in San Francisco and 17 located in the Bay region with Pacific coast headquarters in San Francisco. One hundred and forty-six Eastern manufacturing concerns located their Pacific coast headquarters in San Francisco last year. These Pacific coast headquarters are regarded as forerunners of Western assembling plants.

## Making Steel and Iron Rust-Proof

Rendering iron and steel rust-proof by changing the surface to basic phosphate salts of iron is the basis of a patent (U. S. 1,167,966—Jan. 11, 1916) granted to William H. Allen, of Detroit, Mich. Iron placed in a weak solution of phosphoric acid is attacked and an adherent coat of insoluble ferrous phosphate is formed, which an oxidizing agent makes basic in character and black. The patentee takes advantage of the fact that the more acid phosphate salts of calcium, magnesium, barium or other alkali earth metals in solution react much less violently than when free phosphoric acid is present. By using hydrated manganic oxide and air as oxidizing agents in the presence of this acid phosphate, a layer of ferrous-ferric phosphate is formed, of suitable thickness and black, rendering the metal rust-proof.

An order temporarily restraining the sale of the Pennsylvania Steel Company (and its subsidiaries) to the Bethlehem Steel Company has been granted by United States Judge John Rellstat, at Trenton, N. J., on the application of Joseph H. Brandt of Philadelphia, who is said to be the owner of 139 shares of the preferred stock of the company.

Chrome iron ore marketed in the United States in 1915, according to the U. S. Geological Survey, amounted to 3281 gross tons, valued at \$36,744. In 1914 the sales were only 591 tons, valued at \$8,715.



## DRAWBACK ON METAL PRODUCTS

### Why Tin Cans Were the Leading Factor in 1915 —Largest Year in a Decade

WASHINGTON, D. C., April 25, 1916.—A very large increase in the exports of manufactures with benefit of drawback of the duty paid on imported materials used in their production is shown in the official statistics for the year ended June 30, 1915, which have just been compiled by the Bureau of Foreign and Domestic Commerce. The iron and steel trade shared in this increase but only as to certain items, the details of payments made under the drawback law demonstrating anew the precarious character of any business that may be built up under the statute as modified by the Underwood-Simmons tariff act of 1913 and the regulations which it is practicable to secure thereunder.

The official figures show that while there was an increase of but 6 per cent in the total exports of manufactures for the year 1915 there was a gain over 1914 of no less than 130 per cent in the drawbacks paid, the total being \$7,339,234, 1915 ranking next to 1885, the banner year in drawback payments, when the total was \$8,524,935.

The relation of drawbacks paid on the exportation of goods manufactured in part of foreign materials to the total exports of manufactures of all kinds in the past decade is shown in the following table:

Fiscal Year	Exports of Manufactures	Drawbacks Paid
1906	\$686,023,169	\$5,831,124
1907	740,314,557	5,445,150
1908	742,575,841	6,637,602
1909	671,416,014	6,604,432
1910	768,309,063	6,182,375
1911	907,519,841	6,402,603
1912	1,020,417,687	4,525,570
1913	1,185,104,309	4,543,536
1914	1,099,132,210	3,165,082
1915	1,166,093,728	7,449,236

From these figures it appears that the drawbacks paid in 1915 were greater than during any year of the past decade, and materially exceeded the comparatively high figures in 1908, when an unprecedentedly large number of drawback regulations were issued upon applications by manufacturers who were then making very strenuous efforts to extend their export trade.

#### TIN CANS MORE THAN HALF

A table of the total drawbacks paid on articles manufactured in whole or in part of foreign materials dutiable under the metal schedule of the tariff during the fiscal year 1915 as compared with 1914 shows a total of \$840,838 in drawbacks in 1915 against \$750,965. The largest item in 1915 was \$476,014 drawback on tin cans; in 1914 this item was \$92,835. Other large items in the last fiscal year were \$60,370 on galvanized iron sheets and plates (nothing in 1914), \$104,188 on aluminum plates and sheets (\$150,033 in 1914), \$24,699 on automobiles (\$15,684 in 1914), \$30,354 on aluminum rods and coils (\$96,067 in 1914). Other drawbacks were on structural iron and steel, builders' hardware and razors, locomotives, steel bars, rods and billets.

The increased exports of tin cans with benefit of drawback was due to a peculiar condition. During the early part of the fiscal year 1914 considerable quantities of Welsh plate were imported for use in the manufacture of containers for petroleum intended for exportation. During the remainder of the year the American Sheet & Tin Plate Company supplied this plate, paying the petroleum shippers an unofficial drawback approximately equaling the amount obtainable on foreign plate. In 1915, however, the importation of plate was again profitable as against any proposition the domestic manufacturers were willing to make and as a result the official drawbacks paid on Welsh plate rose from \$92,835 in 1914 to \$476,014. These are by no means record figures, however, as official drawbacks exceeding \$1,000,000 were paid for several years following 1895.

The aluminum products exported were made of crude foreign aluminum. The automobiles were manufactured in part of imported steel ball bearings, sprocket

chains, aluminum bodies, steel chassis, iron castings, spark plugs, etc.; the steel bars, rods and billets of imported tungsten metal and tungsten bearing ores; the galvanized iron sheets, plates and wires were coated with imported zinc; the structural iron and steel was made of imported iron ore, castings, forgings and zinc; the builders' hardware of imported steel ingots and the razors of imported steel strips; the locomotives and other engines were built in part of many imported materials, including bar iron, steel ingots, steel axles, boiler tubes, wheels, tires, copper tubes and steel brake-work.

The provision that has so greatly reduced the efficiency of the drawback principle as applied to the extension of our export trade forbids the allowance of drawback upon the exportation of any product or by-product unless such product or by-product would be dutiable if imported into the United States. It is now no longer possible to obtain a drawback on the exportation of scrap iron or steel which may result from the manufacture of foreign iron or steel plates, bars, rods, etc., into products intended for use in this country and this principle runs through all other industries.

W. L. C.

## Customs Decisions

### STEAM ENGINE REPAIR PARTS DUTIABLE

The latest attempt by importers to broaden the scope of the tariff's free list provision covering agricultural implements resulted in failure the past week when the Board of United States General Appraisers held that certain repair parts for steam engines could not be included in the duty exempt class. A. Hartmann & Co. imported at San Juan, P. R., safety valves, rods, bushes, bolts, nuts and other repair parts, all intended for use on steam engines. As there is no provision in the present tariff law for "parts of steam engines," the collector levied duty at the rate of 20 per cent under the general provision in the act for "manufactures of metal, not specially provided for." The contention of the importers was that, inasmuch as the particular engines for which the parts were intended were exclusively employed to furnish steam power for the operation of plows, such parts were entitled to free entry under the provision in paragraph 391 of the act for "plows and all other agricultural implements of any kind and description whether in whole or in parts, including repair parts." The decision observed that to sustain the contention of these importers would be to open the way for the inclusion in the free list provision of a great variety of metal articles related in no way to agricultural pursuits, while in effect depriving the Government of proper revenue and American manufacturers of protection against foreign importations of machinery, tools and parts.

### FRAISES OR CIRCULAR STEEL FILES

The American Express Company, acting as forwarding and customs agent for domestic purchasers, was sustained in the claim that articles technically known as "fraises" were properly free of duty as "machinery for use in the manufacture of sugar." The articles consisted of circular steel files about 4 in. in diameter by ¼ in. in thickness. They are employed to keep sharpened and in efficient working condition the knives or blades of slicing machines used in the manufacture of beet sugar. The collector at New York was reversed in taking duty.

### BABBITT METAL

The board took favorable action on a protest by the Frank P. Dow Company, Inc., relative to importations made at Seattle of merchandise invoiced as babbitt metal. Duty was exacted at 20 per cent under the metal manufactures provision, whereas the importer, among other claims, asked entry at 10 per cent as "waste, not specially provided for." The secretary of the importing company testified that his concern purchased the material in a shipyard in Victoria, British Columbia, as scrap metal fit only for remanufacture; that after sending the metal to the smelting plant operated by the

firm at San Francisco, where it was melted and cast into square chunks weighing from 30 to 40 lb. each, so-called "zinc-fractures" were found therein which rendered it unsuitable for use in the manufacture of babbitt metal, and that because of the presence of zinc and antimony in the metal it would be a commercial impossibility to make babbitt metal thereof. For that reason, he said, the metal was useless for anything save as junk. It was held that the proper classification was under the "waste" provision calling for duty at 10 per cent. The protest was sustained to that extent, the collector being reversed.

### Production of Copper in United States in 1915

B. S. Butler of the United States Geological Survey has issued an advance statement of the production of copper in 1915 from which the following statistics are taken:

The smelter production of primary copper in the United States in 1915 was 1,388,000,000 lb. compared with 1,150,000,000 lb. in 1914, an increase of 21 per cent. The total value of the 1915 output at an average price of 17.5c. a pound is \$242,900,000 compared with \$152,900,000 for 1914.

The total production of new refined copper in 1915 was 1,634,000,000 lb., an increase of 100,000,000 lb. from the output in 1914.

In addition to the secondary material treated by the regular refining companies, plants that treated secondary material exclusively produced a total of about 332,700,000 lb. as copper and in brass and other alloys of copper, making a total production of 392,274,000 lb. from secondary sources. Of this total at least 150,000,000 lb. was produced by remelting clean scrap produced in the process of manufacture of copper and brass articles.

If the output of plants treating purely secondary material is added to the production of the regular refining companies the contribution from plants in the United States to the world's supply of copper for 1915 is found to be 2,026,000,000 lb.

In addition to the output of metallic copper the regular refining companies produced bluestone with a copper content of 10,621,000 lb.

Returns from all producing companies show that stocks of electrolytic, Lake, casting and pig copper on hand at the beginning of the year 1915 were 173,640,501 lb. and 82,429,666 lb. at the close, showing a decrease in 1915 of 91,210,835 lb.

In addition to the stocks of refined copper there were reported as at the smelters, in transit to the refineries, and at the refineries, blister copper and material in process of refining to the amount of 274,000,000 lb. on January 1, 1916, compared with 203,000,000 lb. on Jan. 1, 1915.

The apparent consumption of refined new copper in the United States in 1915 was about 1,043,000,000 lb. In 1914 it was about 620,445,373 lb. If to the 1,043,461,982 lb. of new refined copper is added the 392,274,000 lb. of secondary copper and copper in alloys produced during the year, it is found that a total of about 1,435,000,000 lb. of new and old copper was available for domestic consumption.

### Spanish Iron and Steel Prices

Prices of iron and steel in the Central Siderurgica, Spain, as quoted from the *Revista Minera* in the *London Iron and Coal Trades Review* are: Rounds and squares according to size, £15 12s. to £17 4s. per ton; sheet bars, slabs, etc., £15 12s. to £16 8s.; hoops and strips, £16 16s. to £20 8s.; angles and tees, £16 8s.; beams, 3 in. to 9½ in., £15 12s. to £16; beams, 10 in. to 12½ in., £16 8s.; channels, 1¼ in. to 5½ in., £16 8s.; channels, 6¼ in. to 9½ in., £16 16s.; sheets and plates, 5½ mm. or over, £16 16s.; sheets and plates, 3 to 5 mm., £17 12s. and boiler plates, £18.

Fuel briquettes produced in the United States in 1915, according to the U. S. Geological Survey, were 221,537 net tons, valued at \$1,035,716. This was the largest for any year except 1914. European countries have developed this industry to large proportions, it being regarded by the Survey as in its infancy in this country.

### Multigraph Company's Novel Profit-Sharing Plan

The American Multigraph Company, Cleveland, Ohio, made the first payment April 15 to its employees under a profit-sharing plan placed into effect Jan. 1, the men being given a dividend of 7½ per cent. The company states that its policy is to make this dividend the same rate as that on its common stock. Under this plan a dividend rate is to be established from time to time by the board of directors and is to be payable quarterly to all eligible employees. Employees who have been in the company's service one year or less will be paid a dividend based upon 100 per cent of the amount of the wages or salary received for the three months prior to the month in which the dividend payment is made. Those in the employ of the company between one and two years will receive a dividend on 105 per cent of their earnings for the three months. For each year of additional service thereafter an extra 5 per cent will be added to the amount of wages or salary on which a dividend is paid, thus increasing at the rate of 5 per cent per year for 10 years, at which time the dividend will be figured on 150 per cent of the earnings. After 10 years the wage dividend will continue to be figured upon the 150 per cent basis. Under this plan the employee not only receives the bonus but the amount of these premium payments increases with the length of service. The bonus plan applies to all employees of the company in Cleveland with the exception of those department heads who are receiving a personal bonus. A man must be in the employ of the company three months before he can share in the profits of the plan.

If an employee is laid off or is absent on account of illness, and returns to work, his service is considered as continuous, but if he leaves the employ of the company of his own accord or is discharged for cause, and is again reinstated, three months must elapse from the time of his reappointment before he begins again to share in the profits.

To encourage the employees to save, the company allows an employee to leave his dividends with it on deposit, and on this, interest at the rate of 5 per cent per annum is paid quarterly. At the first dividend-paying day a very satisfactory number of the employees allowed their dividends to remain on deposit with the company. After a man has been in the employ of the company for five years he is given a service pin. At present fully 100 of the employees are wearing these pins.

A board for the display of safety bulletins in industrial establishments has been placed on the market by the K-H Sign Mfg. Company, Aiken Avenue and Pennsylvania Railroad, Pittsburgh, Pa. It is made in a standard size of 28 x 30 in., and has an all-steel frame with an inside wooden board for attaching the bulletins with thumb tacks. It is fitted with a heavy glass door and electric lights that illuminate the bulletins displayed. The light wiring and steel strap hangers are provided, together with a strong padlock for the door.

Gasoline generating sets consisting of a direct-current electric generator driven by a direct-connected water cooled gasoline engine have been built for the Government by the B. F. Sturtevant Company, Hyde Park, Boston, for use in aeronautical training camps, shops, etc., and for field searchlights. A switchboard, a gasoline tank and a radiator with disk fan form part of the equipment. The apparatus is mounted on two channel irons and the engine, generator and switchboard are covered by a sheet metal housing.

Steel passenger cars in India are now a success. Recent favorable experiments with one steel coach have warranted the Great Indian Peninsular Railway to construct an entire train of such cars, which runs as the Bombay-Delhi express. Each car is 68 ft. long with the body, including the roof, made of riveted steel plates welded to steel supporting members. The underframe is also of steel.

# Machinery Markets and News of the Works

## TOOL DEMAND STEADY

### Midvale Steel Company Makes Inquiry

#### Lehigh Valley Railroad Will Equip Eight Repair Shops—Chicago, Burlington & Quincy to Expend \$650,000 on Shops

The machinery industry of the entire country, apart from the uneasiness of labor, is in a healthy and flourishing condition. Demand may be quieter in some directions, but it nevertheless is steady and sufficient to maintain the total of unfilled orders for machine tools at huge figures. Russia continues the principal foreign buyer. There is less news of new strikes than was expected, but there are enough to cause great inconvenience, especially in Ohio.

The Midvale Steel & Ordnance Company has issued a large list of requirements for a 3-story machine shop it will build at Nicetown, Philadelphia.

The Lehigh Valley Railroad has announced plans for eight small repair shops, for which it will need miscellaneous equipment to cost about \$100,000.

Among the companies in the vicinity of New York who are extending their facilities are the following: Powers Accounting Machine Company, Brooklyn, N. Y.; Bijou Motor Lighting Company, Hoboken, N. J.; Otis Elevator Company, Harrison, N. J., and the Wasson Piston Ring Company, Hoboken, N. J.

Cleveland reports the continuance of a good demand, mostly confined to single tools. Restrictions by Great Britain, which shut off from the English market importations by companies new in the field, have caused the cancellation of some orders. Cranes are in heavy demand.

The New York Central Railroad, through its purchasing department in Cleveland, has inquired for a list of tools, including metal and woodworking machinery, and cranes for its Coalburg, Ohio, shop.

In Cincinnati a good-sized order for portable electric drilling machines was received last week for shipment to Russia. Domestic business in the Cincinnati territory has been curtailed by labor troubles, although the employers are making good headway with their strikes.

The Chicago, Burlington & Quincy Railroad's new shops at West Burlington will cost with equipment about \$650,000. A large power plant is included in the specifications. Westinghouse, Church, Kerr & Co. have charge of the engineering.

Fairbanks, Morse & Co., Inc., Chicago, plan extensions to their Eclipse Works, Beloit, Wis., to cost about \$400,000. The company is asking that over 500 workmen's homes be erected to house the additional force it desires to employ.

Shipbuilding operations continue to multiply on the Pacific Northwest, and builders of both steel and wooden ships are buying considerable equipment. The call for metal-working tools continues in excess of the supply, and the second-hand tools are kept closely cleaned up.

The U. S. A. Engine Company, organized in the Eastern States, with a capital stock of \$1,500,000, has

acquired the Standard Gas Engine Company, San Francisco, Cal. It plans to greatly increase its facilities, and it will add to its line the Southwark-Harris Diesel engine in sizes over 100 hp.

The Canadian market has received a large list of lathes, drilling and milling machines, and other equipment, required by T. McAvity & Sons, Ltd., St. Johns, N. B. Considerable of the equipment is for shell work.

The White Sewing Machine Company, a branch of the White Company, Cleveland, Ohio, has taken over the plant of the Raymond Sewing Machine Company, Guelph, Ont., and will build a plant to cost \$250,000.

## New York

NEW YORK, May 2, 1918.

The market is somewhat quieter but the demand is steady, although foreign business does not amount to much outside of buying by Russia, which is in the market for a lot of equipment, principally engine lathes, on which estimates are being taken. Forging equipment is the exception to this rule and business in this line keeps up at the same rapid pace. A little falling off on requirements of this kind for ammunition work, however, is noticeable.

The Midvale Steel & Ordnance Company has sent out a list of its requirements for boring gun barrels in connection with its recent order for 100 British howitzers. Engine lathes are the principal item.

The Powers Accounting Machine Company, 50 Church Street, New York, is putting in a lot of equipment in a plant in Brooklyn.

The Bijou Motor Lighting Company, Hoboken, N. J., is erecting important additions to its plant to be ready July 1.

A marked change has taken place in the second-hand machinery market. Tools in considerable number are brought out in answer to inquiries and right in this territory competition of some proportion now appears.

The Lehigh Valley Railroad, 143 Liberty Street, New York, has announced plans for the placing in commission of eight small repair shops at important points on the system. Orders have been placed for a supply of planing machines, lathes, boring mills, shaping machines and other tools used in the making of light repairs to locomotives, to cost about \$100,000. When the new tools are delivered they will be sent to shops at Hazleton, Delano and Coxton, Pa., and Auburn, Cortland, Manchester and Buffalo, N. Y. Two of the shops will be in Buffalo, one in the East Buffalo yards and the other at Tift Farm where the Lake terminals of the railroad are located. They will all be used to keep the motive power of the railroad up to the highest possible standard of efficiency. Additional men will be employed at each point.

The Carborundum Company, Niagara Falls, N. Y., has organized the Canadian Aloxite Company, Ltd., as its Canadian branch, with a capital of \$100,000, to manufacture aloxite and other abrasives and electric furnace products in Canada. A site of 8 acres has been obtained from the Canadian Niagara Falls Power Company in Stamford, near Niagara Falls, Ont. Power will be taken from the Canadian Niagara Falls Power Company. The plant will have a capacity of 7000 hp. It will be placed in operation sometime during the summer. The Canadian General Electric is supplying the electrical equipment. The Carborundum Company has recently purchased the plant of the Composite Board Company which has been idle for four years. This comprises about 32,000 sq. ft. of floor space and will be converted into a machine shop and general repair shop. The plant of the Ozone Vanillim Company, adjacent to plant No. 1 of the Carborundum Company, was also recently acquired, and has been converted into a grading plant for the paper and cloth department. Large additions have recently been made to the aloxite wheel plant, consisting of a three-story addition, 144 x 160 ft., and a further addition is to be made during the summer, of 90 x 144 ft. These additions



are for the manufacture of vitrified aloxite wheels. A reinforced concrete construction is employed throughout. The turning department is to be enlarged by the addition of a concrete structure, 60 x 145 ft., and a storage building is to be erected, 145 x 155 ft.

The Otis Elevator Company, Eleventh Avenue and Twenty-sixth Street, New York, is erecting at its Harrison works, Harrison, N. J., an addition to its foundry and a new assembling shop for the assembling of its machines, at an approximate cost of \$80,000.

The Bell Terminal, Garwood, N. J., controlled by the Bell Electric Motor Company, is erecting a building to be occupied by the Continuous Casting Corporation, 790 Broad Street, Newark, N. J. Other buildings leased to manufacturers are as follows: The National Metalizing Company, one building; the George C. Moon Company, wire rope manufacturer, two buildings; the Bell Electric Motor Company, two buildings.

William Huger & Co., Inc., Newark, N. J., has been incorporated with a capital stock of \$125,000 to manufacture jewelry, and is taking up an existing plant.

The Wasson Piston Ring Company, manufacturer of concentric piston rings, Hoboken, N. J., is adding 40,000 sq. ft. of floor space to its new plant at New Brunswick, N. J., and is also enlarging its office. Equipment is being added to allow for a daily output of from 80,000 to 100,000 rings up to 48 in. in diameter, and the company plans to meet the requirements of railroad and similar companies for rings of the largest diameter. M. F. Mills is president.

The Standard Oil Company, 26 Broadway, New York, has awarded contract to the H. D. Best Company, 52 Vanderbilt Avenue, New York, for the construction of a can factory at Paterson, N. J., from private plans.

L. H. Pounds, president of the borough, 2 Borough Hall, Brooklyn, will receive bids until 11 a. m., May 10, for furnishing and installing mechanical equipment in the sewage pumping station at Avenue V, between Tenth and Eleventh streets.

The U. S. Metals Refining Company, 42 Broadway, New York, has had plans drawn for a two-story laboratory building, 51 x 115 ft. C. L. Brauer is the engineer in charge. It will be erected at the company's plant at Roosevelt, N. J.

The Carbo Hydrogen Company, Benedum Trees Building, Pittsburgh, Pa., has started the construction of a plant at Bayonne, N. J., 50 x 150 ft.

Joseph G. Kessler, Russell and Meserole avenues, Brooklyn, N. Y., is taking bids through G. Erda, 826 Manhattan Avenue, architect, for the construction of a one-story foundry, 40 x 60 ft., to cost about \$6,000.

The Maxwell Foundry Company, Rome, N. Y., has filed incorporation papers with a capital stock of \$25,000 to manufacture bronze, iron and steel castings. H. B. and M. H. Maxwell, 501 William Street, Rome, and T. H. Hughes, Utica, N. Y., are the incorporators.

The Overland Buffalo Company, Buffalo, is preparing plans for a four-story and basement service and repair building, 102 x 237 ft., which it will erect at Main and Bryant streets.

The Buffalo Metal Products Mfg. Company, Buffalo, has taken out incorporation papers with a capital stock of \$50,000 to manufacture automobile specialties, pressed steel devices, hardware supplies, etc. D. Reid, J. M. Ellis and W. H. Kelley, Buffalo, are the incorporators.

The Buffalo Weaving & Belting Company, Buffalo, will build an addition to its factory at Chandler Street and the New York Central Railroad Belt Line, of brick and steel.

The U. S. Rubber Reclaiming Company, Buffalo, will build a one-story addition to its plant at Babcock Street and the Erie Railroad at a cost of \$15,000.

Charles M. Crook, Catskill, N. Y., is having plans prepared for a brick manufacturing plant to be built at Hornell, N. Y., at an estimated cost of \$150,000.

The Peter Keeler Building Company, Albany, has contract for erection of a pump and ice house at Loudenville, N. Y., for Frederick G. Peabody, Loudenville.

Recent additions to the plant of the General Electric Company at Schenectady, N. Y., on which it is ready to start work, are: one-story, 60 x 137 ft., and three stories, 90 x 98 ft.

The Apex Steel Corporation, Port Ewen, N. Y., has been incorporated by J. J. Mullaney, 50 Church Street; W. H. Hicken, J. N. Emley, 15 William Street, New York, to conduct business in mining, smelting and manufacturing. The capital stock is \$30,000.

The Curtiss Aeroplane & Motor Corporation, Churchill Street, Buffalo, N. Y., expects to enlarge its branch at Hammondsport, N. Y., from time to time, to meet the necessary requirements; but no big extension is planned, and what-

ever is done will be in the way of additions to the present buildings, and some small or moderate size buildings that may be added. G. R. Hall is treasurer.

## Philadelphia

PHILADELPHIA, PA., May 1, 1916.

The Penn Marine & Ordnance Castings Company, which took over the plant and business of the Penn Steel Casting & Machine Company, Chester, Pa., and the Baldt Steel Company, New Castle, Del., has established its general offices at 132 South Fifteenth Street, Philadelphia, where the executive, sales, purchasing and accounting departments will be located. Rodney Thayer is president; Walter S. Bickley, vice-president; Ivers S. Adams, treasurer, and C. Ferris Jemison, secretary. These officers, with Harvey D. Gibson, Henry J. Fuller, Lewis L. Dunham, Allen L. Corey, J. Ernest Richards, Howard F. Hansell, Jr., F. Wilson Pritchett, Charles Day and Ernest Du Pont are the directors.

The Midvale Steel Company, Nicetown, Philadelphia, received bids May 1 for the construction of a three-story ordnance machine shop, 80 x 496 ft., from private plans.

The Abrasive Material Company, manufacturer of grinding wheels, Bridesburg, Philadelphia, is now completing additions consisting of a two-story building, 75 x 250 ft., of brick and steel, and is erecting nine kilns and a one-story building, 60 x 80 ft., and a second story to part of one of its other buildings. It is also taking bids on a two-story building, about 62 x 120 ft. Frederick S. Dickson, formerly vice-president, has been elected president, succeeding Harlan Page; Lawrence J. Morris is vice-president; Louis T. Byers is secretary and general manager; Samuel P. Byers is treasurer, and J. Harvey Byers is superintendent.

The Audubon Wire Cloth Company, Audubon, N. J., will take bids shortly for the erection of a new building to be added to its plant. It will be 60 x 90 ft., of reinforced concrete, and will be used as a wire-weaving department, enabling it to increase its capacity 30 per cent. Robert T. Korb is president; Henry H. Collins, vice-president, and William H. Egee, secretary and treasurer.

The United States Lock & Hardware Company, manufacturer of padlocks, staple hardware and castings, Columbia, Pa., has purchased adjoining land and to take care of increased demands will erect next fall an additional building, 75 x 120 ft., to be used for the manufacture of its regular line of hardware. C. G. Sauer is treasurer.

The J. K. Rishel Company, Williamsport, Pa., has had plans drawn by Arthur F. Rianhard, Masonic Building, Williamsport, for the construction of a one-story boiler-house, 40 x 50 ft., to cost about \$5,000.

The Haskell Electric Lamp Company, Philadelphia, has been incorporated with a capital stock of \$10,000 by Frank M. Haskell, 5435 Catherine Street; James F. Goodwin, 503 South Forty-sixth Street, and John F. Rogers, Jr., 232 Jamestown Street, to manufacture electric lamps and supplies. It has purchased the equipment, stock and machinery of the Haskell Electric Light Company, 1112 Chestnut Street, Philadelphia.

The John Y. Parke Company, Philadelphia, has been incorporated with a capital stock of \$75,000 by John Y. Parke, August Mandel, Charles H. Carey, Pittsburgh, to manufacture electric lighting fixtures and supplies. For \$67,500 it has taken over the business, stock and equipment of John Y. Parke & Co., 31 North Seventh Street, Philadelphia.

The Bryn-Mawr Motor Car Company, Bryn Mawr, Pa., has been incorporated with a capital stock of \$10,000 by Charles Seidel, Leonard J. Zengel, Bryn Mawr, and Allen C. Hale, Wayne, Pa., to operate a garage and repair shop.

The Atlantic Supply Company, 34 South Seventeenth Street, Philadelphia, has been incorporated with a capital stock of \$5,000 by Floyd L. Ingraham, Gladstone Apartments, Philadelphia; John J. Meehan, 5408 Chancellor Street, Philadelphia, and Francis M. Gumbes, Oaks, Pa., to manufacture and sell metals, machinery, paint, etc.

The Swain-Hickman Company, Philadelphia, with a capital stock of \$30,000, has been incorporated by Charles J. Swain, 4418 Spruce Street, Philadelphia; John T. Hickman, 4945 Chestnut Street, Philadelphia, and Henry Gross, 934 Land Title Building Philadelphia, to manufacture automobiles, motors and motor accessories.

The Metz Structural Steel Company, Bridgeport, Pa., which has been formed by Walter T. Metz of Norristown, Pa., and others, has started operations in a plant which it has just completed at Second and Mill streets. It is in the market for a second-hand punch.

The General Mfg. Company, Swanson and Snyder streets, Philadelphia, chemical manufacturer, has awarded contract to H. P. Friend, Norristown, Pa., for alterations to its machine shop, to cost \$1,000.

## New England

BOSTON, MASS., May 1, 1916.

The New Haven Lines have been obliged to restore the embargoes in a large part, and an embargo by the Delaware & Hudson has seriously affected deliveries to Massachusetts factories. The situation in Hartford, Conn., is, if anything, worse than it has been for several weeks, and Waterbury and Torrington are but little better off. During the time the embargoes were lifted much raw material was rushed in, and many manufacturers were unable to take care of the large consignments which piled up on sidings and in freight houses. In many instances cars are just reaching consignees which should have arrived in January.

Frank L. Cone, Windsor, Vt., who recently resigned as superintendent of the Windsor Machine Company, has begun the erection of a machine shop, 60 x 100 ft. He will manufacture a large automatic lathe, on which he has just secured patents, and will employ about 100 hands.

The Estabrook Estate, Worcester, Mass., is to build a four-story factory, 57 x 130 ft., on Jackson Street. This factory will be an addition to the group now owned by the estate and will be rented to small industries.

The Monarch Mfg. Company, Boston, Mass., machinery, has been incorporated with capital stock of \$50,000 by Frank P. Robinson, S. Franklin Sutherland and Henry W. Sprague.

The plant of the Rattan Mfg. Company, 552 State Street, New Haven, Conn., was destroyed by fire April 26, with loss of about \$25,000.

The F. R. Patch Mfg. Company, Rutland, Vt., will rebuild at once the forge and wood-working shop destroyed by fire April 19. The company is engaged in munition work. Six heat-treating furnaces and a number of lathes were in the burned structure.

The Keystone Stoker Company, 141 Milk Street, Boston, Mass., is having plans drawn for a factory, 60 x 120 ft., one story, to be built in Greenfield, Mass.

The New England Machinery Company, New Haven, Conn., has increased its capital stock from \$25,000 to \$100,000.

The Willimantic & Manchester Street Railway has been organized to build a trolley line from Willimantic to Manchester, Conn. William S. Hyde of Manchester is president, and Edward M. Yeomans of Andover is vice-president. A contract, involving approximately \$1,000,000, for the construction of the line has been given to the C. E. Coon Construction Company, Cleveland, Ohio.

## Chicago

CHICAGO, ILL., May 1, 1916.

Railroad inquiry features the prospective business now being figured by local machinery dealers. The Chicago, Burlington & Quincy is receiving bids on a number of engine and turret lathes, shapers and boiler shop tools for its new West Burlington shops, to which attention has been previously called. The Chicago & Northwestern is in the market for locomotive repair shop equipment, consisting largely of bolt-making machinery, forging presses and plate-working tools. Tentative figures are being asked by the Illinois Central for some twelve machines for machine shop work. The general trade is moving more moderately, both because of slackened demand and the labor difficulties with which manufacturers are contending. The call for universal millers, cylindrical grinders and tool grinders is, however, still insatiable.

Fromann & Judson, Schiller Building, Chicago, architects, have prepared plans for factory buildings to be erected for Frank Vogler, 1684 Elston Avenue, Chicago, at a cost of \$17,000.

The Goods Machine Company, Chicago, has been incorporated with a capital of \$30,000 by Orrin P. Goods, 35 North Dearborn Street, George M. Rowley and Stephen C. Knight.

The Rich Twist Drill Company, 4550 West Congress Street, Chicago, through J. C. Llewellyn, architect, 38 South Dearborn Street, is receiving bids for the erection of a one and two-story mill building, 40 x 250 ft., and a one-story steel frame building, 37 x 115 ft., to be erected at Battle Creek, Mich., at a cost of \$50,000. George R. Rich is president.

The L. A. Harsha Mfg. Company, 2010 Carroll Avenue, Chicago, has let contracts for a four-story factory, 60 x 75 ft., at Kinzie and Lincoln streets, to be equipped for the manufacture of moldings and picture frames.

The Board of Education of Chicago has awarded contracts for a one-story boilerhouse, 117 x 147 ft., to cost \$50,000. A. F. Hussander, 7 South Dearborn Street, is the architect.

The American Can Company is taking bids for the erection of an addition to cost \$50,000 at its plant at St. Paul, Minn. The building is to be 45 x 130 ft., four stories. E. C. Ritchell is superintendent.

The Graham Valve Company, recently organized with a capital of \$250,000, has begun work on the erection of its plant at St. Paul, Minn., including a machine shop and brass foundry. George Graham is president.

W. W. Baldwin, vice-president of the Chicago, Burlington & Quincy Railroad, advises that the new West Burlington shops will include a locomotive erecting and machine shop, 310 x 600 ft., in which will be installed two 125-ton cranes and two 75-ton cranes. The building and its machinery equipment are to cost approximately \$650,000. A large power plant is included in the plans at a cost of about \$350,000. Westinghouse, Church, Kerr & Co. are engineers in charge of construction.

The Northern Pacific Railroad roundhouse and machine shops at Dickinson, N. D., were recently destroyed by fire with an estimated loss of \$100,000.

The Atchison, Topeka & Santa Fe Railroad recently purchased for \$15,000 a forging hammer to be installed in the blacksmith shop extension at its shop at Topeka, Kan.

Smith & Co., Champaign, Ill., have let contract for an ice and cold-storage plant.

The City of Belleville, Ill., will build a light and power plant to cost \$350,000.

The Monroe Automobile Company, Flint, Mich., will remove its plant to Pontiac, where factory buildings already erected will be occupied. R. F. Monroe, president, announces that additions will be erected.

The Morton Mfg. Company, Muskegon Heights, Mich., has awarded contracts for the brick and steel addition, 80 x 200 ft., which it will shortly erect.

The Wilson Mfg. Company, Appleton, Wis., has made arrangements for the removal of its business to Menominee, Mich., where a two-story wood-working mill will be erected.

## Indianapolis

INDIANAPOLIS, IND., May 1, 1916.

A site has been obtained along the Chesapeake & Ohio Railroad, at Marion, Ind., for factory buildings for the Klob Gas Stove Company, which is to move its plants there from Piqua and Greenville, Ohio. John F. McClain is president, Henry C. Berger, vice-president, and Allen G. Messick, secretary.

The plant of the Delta Electric Company, Marion, Ind., was destroyed by fire, April 26, with a loss of \$30,000. Until new machinery is obtained the company will use the plant of the Marion Brass & Bronze Company. Arthur E. Case is general manager of the electric company.

The Federal Pattern Works, Indianapolis, Ind., has been organized with a capital of \$10,000 to manufacture wood and metal patterns. The incorporators are Thomas A. Lavelle, Frank D. Henzie and Thomas J. Jones.

The Muncie Welding & Cutting Company, Muncie, Ind., operating a contract shop, has located at 837 South Walnut Street, in that city, having moved its plant from Indianapolis, where it operated as the Guarantee Welding & Cutting Company. F. H. Sidenstick, the proprietor, is also a designer of cutting and welding torches.

The National Steel Casting Company, manufacturer of car couplers, Montpelier, Ind., which had been considering moving to Fort Wayne, has decided to remain in Montpelier, and has decided upon additions to its plant to be made at a cost approximating \$75,000, and it is expected that the capacity of the foundry will be doubled. It has orders on which to operate for six to eight months. T. C. Neal is general manager.

The Slide-O-Graph Company, Evansville, Ind., has been incorporated with \$50,000 capital stock to manufacture moving-picture machines, screens, etc. Carl J. Wilde, Adolph Volderauer and Alma Scheller are the directors.

The Central Foundry Company's plant at Vincennes, Ind., after two years' idleness, will soon resume operations, having as its lines soil pipe and plumbers' supplies. It formerly employed 400 men.

The Knight-Brinkerhoff Piano Company, Brazil, Ind., has reopened its foundry, which has been idle for several months. The receivership has been dismissed.

The Auburn Chassis Attachment Company, Auburn, Ind., has been incorporated with \$25,000 capital stock to manufacture automobile accessories. Harry C. Henry, Lloyd B. Gatten and W. D. Stump are the directors.

The Builders Iron Works, Hammond, Ind., has been incorporated with \$9,000 capital stock to manufacture builders'

supplies. The directors are John H. McClay, Edwin Bruhn and Frank R. Betz.

The Gilderman Mfg. & Foundry Company, Syracuse, Ind., manufacturer of furnaces and engine castings, will move its plant to La Porte, Ind. George W. Gilderman is general manager.

The Hoosier-Sub-Carburetor Company, Dunkirk, Ind., has been incorporated with \$10,000 capital stock to manufacture auto parts. Charles W. Smalley, George Black and John W. Fudge are the directors.

The Bucyrus Steam Shovel Company, Evansville, Ind., has about a year's orders ahead, including those for more than one hundred large steam shovels. Other departments are making shells and shrapnel cases. The company is now working a full day and night force.

## Cleveland

CLEVELAND, OHIO, May 1, 1916.

New demand is confined mostly to single tools, orders for which are coming out in good volume, although many inquiries are not resulting in business because of unsatisfactory deliveries. Some cancellation of orders placed in the East during the heavy buying period is noted, due, it is said, to restrictions placed by England on American machinery purchases that shut out from the British market some companies new in the machine tool field. These cancellations have helped somewhat to ease up deliveries on standard tools. The call for screw machines continues quite active. Cranes are still in heavy demand. The scarcity of labor is daily becoming a more serious problem with manufacturing plants and foundries. Many manufacturers find it impossible to secure material as needed, particularly castings.

The West Steel Casting Company, Cleveland, will shortly begin the erection of a steel addition to its plant, about 60 x 200 ft. A portion of the building will be two stories to provide space for office purposes, pattern storage and a laboratory. An additional 2-ton converter will be installed. The plant is now equipped with two 2-ton converters.

The New York Central Railroad Company through its purchasing department in Cleveland has an inquiry out for the following metal-working and wood-working tools and cranes for its Coalburg, Ohio, shops:

- One planing machine.
- One 4-spindle combination horizontal car boring machine.
- One vertical hollow chisel car mortiser with two vertical boring attachments.
- One 42-in. band sawing machine.
- One 36-in. rip sawing machine.
- One 2-in. triple head bolt cutting machine.
- One 2-in. pipe threading machine.
- One 12-in. power punching machine.
- One 250-lb. power hammer.
- One 28-in. vertical drilling machine.
- One 3 x 18-in. emery grinding machine.
- Two 10-ton standard electric traveling cranes.

The Golding & Sons Company, East Liverpool, Ohio, will erect a new plant, 91 x 244 ft., of brick, steel and concrete. A gas engine will be installed.

A manufacturing plant will be erected on a site, 60 x 250 ft., on East Fifty-fifth Street, Cleveland, by James Metzbaum and others, to be occupied by a company which will manufacture garage heaters.

The Kuhlman Car Company, Cleveland, has had plans prepared for an extension to its plant and will place contracts shortly.

The Metals Welding Company, Cleveland, has enlarged its plant by the erection of a building, 26 x 88 ft.

The Champion Register Company, Cleveland, maker of cash registers, will shortly place a contract for the erection of a new two-story factory, 60 x 350 ft., of reinforced concrete. Plans are being prepared by William C. Owen, architect, Leader-News Building.

The Goodyear Tire & Rubber Company, Akron, Ohio, will erect a new manufacturing building, 240 x 380 ft., five stories and basement, of brick and steel.

J. E. Galvin, of the Ohio Steel Foundry Company, Lima, and others, are interested in the organization of a company to build a steel foundry at Springfield, Ohio.

The Galion Iron Works & Mfg. Company, Galion, Ohio, which recently completed a foundry addition, has commenced the erection of another extension, 68 x 100 ft., to be used largely for its cast-iron pipe department. It is also erecting an addition to its main manufacturing department.

The Weber Dental Mfg. Company, Canton, Ohio, will erect a one-story building, 30 x 100 ft., for a polishing and plating department.

## Milwaukee

MILWAUKEE, WIS., May 1, 1916.

Milwaukee machinery manufacturers at this moment find no manifestation of a revolt on the part of the labor unions, which have been expected to make an organized demand at this time for an 8-hr. day and higher wages. What the next few days will bring is conjectural, and the situation is viewed with some apprehension, as the activities of professional agitators for the last six months would indicate trouble.

Numerous metal-working establishments which are completing extensions are finding much scarcity of skilled labor in their efforts to man the new shops. To this is added the difficulty of getting delivery of new tool equipment, although machines built in Milwaukee are being delivered as agreed. The freight congestion adds to the troubles. No industrial center in Wisconsin, excepting perhaps Milwaukee, is experiencing so great a boom as Beloit, where unusual plant extensions are being put under way. There is no lack of orders in machine-tool shops, which still have more business offered them than they can take care of.

Extensions and improvements estimated to cost over \$400,000 are planned by Fairbanks, Morse & Co., Inc., Chicago, at its Eclipse works in Beloit, Wis. The company asks the Beloit Commercial Club to make provision for caring for the workmen and their families, who will be employed when the enlargement is completed, since a number of married men who have been induced to come to Beloit will not stay because they cannot get homes within their means to which they can bring their families. More than 500 homes which workmen may purchase on the installment plan at from \$1,400 to \$1,800, or which can be rented at from \$16 to \$18 per month, and many additional boarding and rooming houses are needed. It is employing 2700 men now at this plant, compared with 1800 a year ago.

From 400 to 500 workmen will be added to the payroll of the P. B. Yates Machine Company, Beloit, Wis., as soon as the new shop is completed. A part of the new building will be used for the blacksmithing department and the remainder as a machine shop.

The Cowles-Van Danaker Construction Company, St. Paul, Minn., has taken the contract for erecting the new factory of the Gillette Safety Tire Company, Eau Claire, Wis.

The Federal Rubber Mfg. Company, Milwaukee, has awarded general contract to the Fred T. Ley Company, Springfield, Mass., for the erection of three buildings at its Cudahy Works, including a manufacturing building, 112 x 235 ft., seven stories and basement; a storage and shipping building 106 x 113 ft., one-story, and a manufacturing building, 116 x 200 ft., one-story and basement, with foundations for six additional stories. The two factory buildings will be of brick on steel skeleton, and the warehouse of reinforced concrete. B. H. Pratt is general manager of the Federal Company.

The Townsend-Metcalf Automobile Company, Reedsburg, Wis., is erecting a three-story addition and will buy shop equipment. Glen Keebler and Charles Bohls are the proprietors.

The Globe Foundry & Machine Company, Sheboygan, Wis., has disposed of its chair iron business to the Gilson Mfg. Company, Port Washington, Wis., which now becomes the largest producer of castings for furniture in the Middle West. The machinery and other equipment are being moved to Port Washington. Harry W. Bolens is president and chief owner of the Gilson Company.

The Optenberg Iron Works, Sheboygan, Wis., and C. M. and George Crilley, Milwaukee, have organized the Central Construction Company, with a capital stock of \$25,000, to undertake contracts for the enlargement of the Sheboygan municipal waterworks and sewerage system.

F. J. Moeller, Sturgeon Bay, Wis., will erect a machine shop addition to his garage, 30 x 60 ft.

The Farmers' Co-operative Packing Company, Madison, Wis., has awarded the general contract for its new plant, to cost \$350,000, to the Mueller Construction Company, 179 West Washington Street, Chicago.

The Goethal Blow Pipe & Ventilating Company, 627 Prairie Street, Milwaukee, has increased its capital stock to accommodate increased volume of business. New equipment is being purchased and later the shop will be enlarged.

Pocock & Pollard, Minneapolis, have taken the contract for erecting a 50,000-gal. steel tank and furnishing one 400-gal. centrifugal pump and one 1500-gal. high-pressure pump for the municipal waterworks system at Hayward, Wis.

The Boerner Auto Company, Cedarburg, Wis., has purchased the garage and machine shop of William Roebken and will not erect a new building, as previously noted.

The Manufacturers' Foundry Company, Fifteenth and Oklahoma avenues, Milwaukee, has awarded contracts for a brick and steel foundry addition, 84 x 100 ft., one story, to provide additional facilities.



The Key Safe Company, Milwaukee, organized last year to manufacture safes and strong boxes, has increased its capital stock from \$25,000 to \$50,000.

The Southern Wisconsin Railway Company, Madison, Wis., has increased its capital stock from \$100,000 to \$600,000 in preparation for extensive new construction and equipment work to be undertaken this year. F. W. Montgomery is president.

The Liebl & Retzlaff Mfg. Company, Luxemburg, Wis., will erect an addition to its foundry and machine shop, 30 x 60 ft., of reinforced concrete.

The Carpenter & Freyer Company, Waukesha, Wis., will take possession of its new garage and machine shop on Main Street, May 8.

Holte & Currier, Stevens Point, Wis., have sold their machine and automobile repair shop to Joseph and William Koehn, Sheboygan, Wis.

The Werra Aluminum Company, Waukesha, Wis., a large producer of automobile castings, is having preliminary plans prepared for an addition to the foundry and finishing shop. It is occupying the former Wisconsin Central car shops, which are inadequate to accommodate its business. Conrad Werra, formerly manager of the Aluminum Castings Company's foundry at Manitowoc, Wis., is president.

The Reedsburg Auto Company, Reedsburg, Wis., will build a one-story addition, 56 x 115 ft., to be used exclusively for repair shop accommodations.

Jacob Scholtz and Nat Yampol, Milwaukee, have organized the West Side Sheet Metal & Furnace Works, and have opened a shop at 2451-2453 Walnut Street.

C. H. Lohr, Hartford, Wis., is building an addition, 25 x 70 ft., to his garage for machine shop purposes.

The Bain Wagon Company, Kenosha, Wis., has begun the erection of an addition to its plant, 53 x 237 ft., for the main section, and 45 x 175 ft., for the wing, all three stories high. The company has been in need of additional room for some time.

## Cincinnati

CINCINNATI, OHIO, May 1, 1916.

A good-sized order for portable electric drilling machines was received last week for shipment to Petrograd, Russia. The foreign demand for machine tools continues to decline, and Russia appears to be the only buyer in this line. Domestic business is also slower, as strikes in different parts of the country have curtailed purchases. The leading Corliss engine builder in this section has a sufficient number of contracts in hand to keep its plant operating at full capacity. The boiler and tank business has improved.

Patternmakers in two large shops in Hamilton, Ohio, are still on a strike. The demands were for an 8-hr. day with a minimum wage of 48c. an hr. Employers in Springfield, Piqua, Urbana and Columbus, Ohio, who have been troubled with machinists' strikes are reported to be making some headway in securing men to take the places of the strikers, but they are operating their plants much below capacities.

The Auto Vehicle Parts Company, Cincinnati, has made a deal with the Higgin Mfg. Company, Newport, Ky., to take over its carriage top trimming department. The business will be removed to Cincinnati as soon as arrangements can be made. Clarence J. Rennekamp is vice-president and secretary.

The Groves Chemical Company, St. Bernard, a Cincinnati suburb, has arranged to purchase the plant of the Central Mfg. Company, Lockland, Ohio. The chemical company recently lost its plant in St. Bernard by fire.

The Niles Tool Works Company, Hamilton, Ohio, will make an addition to its plant to be used as a tool room shop.

The Fischer Can Company, Hamilton, Ohio, will be the name of a company incorporated to install a plant for making tin cans. Information may be obtained from C. R. Greer, secretary Hamilton Chamber of Commerce.

The Buckeye Mfg. & Foundry Company, Overpeck, Hamilton, Ohio, has commenced rebuilding its foundry, recently destroyed by fire.

The Moore-Eastwood Mfg. Company, Dayton, Ohio, has been incorporated with \$25,000 capital stock to manufacture tools and dies. A. C. Eastwood and E. F. Moore are the principal incorporators.

The Industrial Tool, Die & Engineering Company, Dayton, Ohio, has been incorporated with \$50,000 capital stock by C. C. Wilson, E. A. Stir, and others. Nothing is known as to its manufacturing plans.

It is reported that the Cincinnati, Hamilton & Dayton Railroad Company will consolidate its two roundhouses at Dayton, Ohio. The construction of a new power plant will be necessary if these plans are carried out.

The addition to the plant of the Robbins & Myers Company, Springfield, Ohio, is well under way and will be ready for the necessary machinery July 1. It manufactures electrical equipment.

The Columbus Railway, Power & Light Company, Columbus, Ohio, has taken out a permit for a new power plant estimated to cost \$375,000. Work will commence at an early date.

The Urbana Packing Company, Urbana, Ohio, contemplates additions to its plant that will require one 150-hp. engine, boilers, a 50-ton ice plant and other equipment.

The power house of No. 12 mine of the Superior Coal Company, Wellston, Ohio, was recently destroyed by fire. It will be rebuilt at once.

## Baltimore

BALTIMORE, Md., May 1, 1916.

The plant at Fulton Station, Baltimore, formerly used by the Baltimore Car Wheel Works, has been taken over by the Vulcan Brake Shoe & Equipment Company, a Delaware corporation recently formed, with headquarters in this city. The statement is made that after improvements are completed the plant will be used for the manufacture of railroad equipment.

The Harvey Company, 113 South Street, Baltimore, is seeking prices on 10, 15 and 20-ton locomotive cranes.

The Speakman Supply & Pipe Company, Thirtieth and Spruce streets, Wilmington, Del., will erect a one-story brick addition to its foundry.

A two-story addition is planned by the Old Dominion Packing Company, Buchanan, Va.

Plans are being made to enlarge the plant of the International Steel Plate Company, Quantico, Va.

## The Central South

LOUISVILLE, KY., May 1, 1916.

Plenty of inquiries and immediate business are before the trade. Prospects are excellent for continuation of conditions on the existing or a better basis. Most of the difficulty continues to be the paucity of materials and one of the power equipment manufacturers speaks of losing a big order because he could not guarantee delivery until September. High prices in the ice machinery field have caused postponement of contracts obtained until next season, in several cases. In the electrical equipment and tool field, however, the market is absorbing the increases in price readily, price being no object if the machinery can be obtained.

The Electric Prepay Meter Company, authorized to manufacture patented devices for installing electrical equipment, etc., has been incorporated in Louisville with \$50,000 capital. N. D. and H. R. Abell, 814 Starks Building, Louisville, and J. D. Sheridan are incorporators. A plant is being considered and the principal product will be an attachment to attach to standard meters.

The Louisville Motor Repair Company, Louisville, has incorporated with \$2,500 capital, E. H. Ortnier, Ernest Moore and John Artt, incorporators, and has acquired an existing repair shop.

An increase in the capital stock of the International Ditching & Farm Machinery Company, Owensboro, Ky., from \$50,000 to \$200,000 has been made. Charles A. Rogers, W. R. Williams and J. C. Bunch are stockholders.

Dan Daly has re-equipped his machine shop at Lime-stone and Second streets, Louisville, with new lathes, drills, etc., and will manufacture machinery parts and do general repairs.

The movement to organize a water company in Jackson, Ky., has resulted in the incorporation of a \$25,000 company by J. S. Redwine, M. S. Crain, Lewis Hays, Jr., M. H. Holliday, W. B. Kash and R. I. Kerr.

The Hagan Gas Engine Company, Winchester, Ky., is working to full capacity and the management is discussing operating a night shift or an extension of its plant. A large contract for special parts of machine tools has been taken by the company.

Addition of a 500-hp. boiler to the power plant of the Kentucky Traction & Terminal Company is projected. The capacity of the generators now in use exceeds the horsepower of the present boiler equipment. Other improvements to total \$40,000 are projected. F. W. Bacon is vice-president and general manager.

At Elwood, Ind., work on the machinery of the Elwood Iron Foundry plant is being pushed and operations will be resumed as soon as possible after lying idle for more than a year.

The E. L. Hinson Company, Clarksville, Tenn., has been organized with \$13,500 capital to manufacture mill machinery. E. L. Hinson, J. P. Dunlop, John Ward, L. C. Westenberg and W. M. Perkins are the incorporators. Flouring mill supplies will be manufactured at the outset.

The Holston Lumber Company, Johnson City, Tenn., has been organized with \$25,000 capital by J. P. Rhea, E. J. Vaught, W. H. Harmon, and others.

The Peter-McCain Lumber Company, Bristol, Tenn., has purchased a \$50,000 tract of timber and will cut and ship to a band mill at Bristol.

At Nashville, Tenn., the T. H. Dunlap Lumber Company, with \$25,000 capital, has been incorporated by T. H. Dunlap, M. M. Ransom, E. N. Ralston, and others.

An increase in capital of from \$75,000 to \$110,000 is being made by the Acme Box Company, Chattanooga, Tenn.

The John G. Duncan Company, 308 West Jackson Avenue, Knoxville, Tenn., is in the market for a second-hand medium-sized steam nigger and is asking for dealers' prices.

## Birmingham

BIRMINGHAM, ALA., May 1, 1916.

Wholesale machinery dealers report a somewhat brisker week owing to an influx of orders from a variety of small factories and a renewal of demand for hydroelectric apparatus. The inquiry indicates a satisfactory future.

W. F. Fullington, Gadsden, Ala., will develop manganese iron ore deposits.

Coke & McTyer will rebuild the cotton compress at Sheffield, Ala., recently burned with a loss of \$100,000.

The Sumter Mfg. Company, Livingston, Ala., with a capital stock of \$20,000, will manufacture heading and veneer goods. R. S. Bacon, A. C. Lainke and others are stockholders.

The Brunswick Marine Construction Company, Brunswick, Ga., will establish a shipbuilding plant. Albert Fendig, Brunswick, and others are stockholders.

Ground is being cleared at Miami, Fla., for the shops of the Florida East Coast Railway, which are to cost \$250,000 and to be built this year.

The Hydraulic Stone Company, Cocoa, Fla., with a capital stock of \$20,000, will manufacture concrete blocks, etc.

The Foster Creek Lumber & Mfg. Company, Gloster, Miss., with a capital stock of \$1,000,000, will develop 52,000 acres of timber land, expending \$300,000 to \$400,000 on mill town, double band mill, etc., in Wilkinson County on the Mississippi & Yazoo Valley Railroad. Fred M. Stephenson, Chicago; George L. Stephenson, Milwaukee; A. E. Proudft and Edward J. Young, of Madison, Wis., are promoters. The general offices will be in Madison, Wis.

## Texas

AUSTIN, TEX., April 29, 1916.

There promises to be an unusually large number of cotton gins and cotton compresses built in Texas this spring and summer. Orders for this class of machinery are already being placed. Crop conditions are fine and farm work is advanced, as compared with last year.

The Austin Motor Company, Austin, will install a complete repair shop and service station in its garage.

The Gulf Menhaden Company, Galveston, is building a plant on St. Joseph's Island, near Aransas Pass, for extracting oil from menhaden and converting the refuse into fertilizer. The plant will have a capacity of 200 bbl. of oil daily and will cost \$150,000.

The Texas Light & Power Company, Dallas, plans to build an electric power station at Austin. It will also soon install four additional boilers, each of 600-hp., in its central power station at Waco.

The Lone Star Tool Company, Wichita Falls, has increased its capital stock from \$20,000 to \$25,000 for the purpose of enlarging its business.

The Gulf Refining Company, Beaumont, has increased its capital stock from \$1,500,000 to \$7,500,000. It is reported that the additional capital will be used to greatly enlarge its oil refining and pipe line facilities.

The K-W Light & Power Company, Magdalena, N. M., has been incorporated with a capital stock of \$50,000 to build and operate an electric light and power plant.

Tyler, Tex., will take over the present waterworks plant, rehabilitate and enlarge it. Bonds to the amount of \$250,000 have been issued for the purpose.

The Mexican Petroleum Company will enlarge its oil refinery at Tampico, Mexico, from 20,000 bbl. of crude oil daily to 30,000 bbl.

The Tennant-Lovegrove Company, Houston, has been incorporated with a capital stock of \$10,000 for the purpose of manufacturing steel products. The incorporators are W. H. Lovegrove, Joseph A. Tennant and George Hamman.

The Texas Iron & Metal Company, Dallas, has been incorporated with a capital stock of \$10,000 by Aaron Grossman, Moses Feldman and A. Z. Goldstein.

## St. Louis

ST. LOUIS, MO., May 1, 1916.

Business among machine-tool dealers shows no signs of diminution—rather the pressure seems to be getting greater, so far as it relates to volume of demand and breadth of inquiry. A disposition is noted, however, to await patiently delivery of equipment which is still far behind and catching up but slowly. New enterprises now forming are making their plans with regard to the equipment situation.

Directors of the Iron Mountain Railroad and others, including B. F. Bush and John T. Milliken, have completed arrangements for the erection and equipment of a grain elevator to cost about \$1,500,000, to be situated in St. Louis, near the company's tracks.

The Standard Corrugated Box Company, St. Louis, Mo., has been incorporated with a capital stock of \$15,000 by George C. Huth, Jr., Headlee Summers, R. C. Urquhart and others and will equip a plant to manufacture paper and fiber boxes.

The H. M. T. Chemical Company, Merchants Laclede Building, St. Louis, Mo., has acquired a site in East St. Louis, Ill., and will build a plant to manufacture coal tar dyes, at a cost of about \$50,000.

The W. M. Boyle Mfg. Company, Kansas City, Mo., has been incorporated with a capital stock of \$100,000 by Robert D. Flood, D. W. Ogden and William M. Boyle to manufacture wood products.

The Missouri-Haynes Auto Company, Kansas City, Mo., has been incorporated with a capital stock of \$30,000 by George A. Jones, Harry A. Cook and F. Lindley and will equip a machine and repair shop and garage.

The Lasswell Land & Lumber Company, Arbyrd, Mo., has increased its capital stock from \$50,000 to \$100,000 to enlarge its mill equipment.

The Midland Milling Company, North Kansas City, Mo., has been organized by George Innes and Fred O. Shane, Philadelphia, Pa., and James A. Innes, Eagle Grove, Iowa, and will equip a flour mill, including power plant, of 1200 bbl. daily capacity. Later the capacity will be doubled.

The United Zinc Smelting Corporation, 115 Broadway, New York, N. Y., has acquired control of the Kenefick Zinc Corporation properties in the Joplin, Mo., district and will add two retort blocks of 912 blocks each, and will also equip a sixth zinc mill. Plans are also being prepared for an acid plant.

Plattsburg, Mo., has plans for a waterworks plant to cost about \$35,000. E. R. Murray, Kansas City, Mo., is consulting engineer.

The Roesch-Kohl Enamel Range Company, Belleville, Ill., has been incorporated with a capital stock of \$15,000 by Joseph P. and Arthur A. Roesch and William A. Busiek, and will equip a plant to manufacture ranges.

The Standard Milling Company, Houston, Tex., is reported in the market for complete equipment for a rice mill at Stuttgart, Ark., to cost \$100,000.

The Merchants & Farmers' Gin Company, McGehee, Ark., George B. Ewing, president, will equip a cotton gin. Machinery to cost about \$12,500 will be required.

The Lambe & Denmarke Light & Water Company, Arkansas City, Ark., will install one 120-hp. crude oil engine, one 100-kw. generator, centrifugal pumps of 300 to 400 gal. per minute capacity, motors, etc., at a total cost of about \$20,000.

The Newport Water, Light & Power Company, Newport, Ark., will expend about \$25,000 on equipment for an electric light plant.

The Arkansas Light & Power Company, Paragould, Ark., E. T. Reynolds, manager, will add three 200-hp. boilers and a turbo generator to its equipment.

The Three States Lumber Company, Burdette, Ark., has completed plans for a mill of 20,000,000 ft. annual capacity to replace its burned plant.

H. F. Sinclair, Tulsa, Okla., is reported to have completed a large oil refinery and well consolidation, and to have plans for considerable additions to the refineries taken over as well as pipe line and pumping plants, etc., to make possible the equipment of refineries at St. Louis, Mo., and Chicago, Ill.

The Interstate Compress Company, Altus, Okla., will equip a plant to cost about \$40,000 to replace its burned compress.

The Davis Mfg. Company, organized at Enid, Okla., has elected the following officers: President, J. T. Hines; treasurer and general manager, A. L. West; secretary, Geo. D. Wilson; superintendent, T. E. Foster. The company will manufacture a rotary threshing machine, the separation being accomplished by centrifugal force. The plant formerly occupied by the Enid Metal Company has been leased.

The Pontotoc County Oil Company, Ada, Okla., has been incorporated with a capital stock of \$100,000 and will equip a cotton-seed oil mill.

The Consumers' Oil Company, Muskogee, Okla., with a capital of \$16,500,000, will consolidate a number of oil properties and equip a refinery of 8000-bbl. capacity and two gasoline plants.

The Victor Gasoline Company, Tulsa, Okla., has increased its capital stock from \$50,000 to \$450,000 and will add to its plant equipment.

The Leidecker Lawn Mower Company, Muskogee, Okla., has been incorporated with a capital stock of \$14,000 by F. W. Leidecker and others and will equip a machine shop.

Pauls Valley, Okla., will expend about \$16,000 on equipment for a waterworks plant. The mayor can be addressed.

C. L. Graham and others will equip a cotton gin at Strayhorn, Miss., the machinery to cost about \$15,000.

The People's Compress & Storage Company, Tupelo, Miss., has been incorporated with a capital stock of \$50,000 by W. R. Humphrey, R. L. Taylor and others and will equip a cotton compress and gin.

The Foster Creek Lumber & Manufacturing Company, Madison, Wis., with a capital of \$1,500,000 will equip a double band sawmill plant at Gloster, Miss., to cost about \$400,000. George L. Stephenson, Milwaukee, Wis., is general manager, and A. E. Proudft, Madison, Wis., treasurer.

The Consolidated Oil Refining Company, St. Louis, Mo., will equip a refinery at Shreveport, La., with a daily capacity of 2500 bbl. at a cost of \$60,000. C. E. Grevenberg, Shreveport, can give information.

The plant of the Gilbert Hunt Company, Walla Walla, Wash., manufacturer of threshing machines, has been taken over by bondholders represented by R. W. Moore, Chicago, C. A. Timble, Princeton, Ill., and H. F. Lindsey, Milwaukee, and, it is stated, will be overhauled and placed in operation. It has been in the hands of receivers for some time.

The Big Bend Machinery Company, Ritzville, Wash., has been incorporated for \$10,000 by W. F. York, R. H. Mills and C. P. Blankenship.

The Western Scale Company, Vancouver, Wash., has been incorporated for \$200,000, to manufacture Gageweigh truck scales and will erect a plant in Vancouver. The incorporators are John B. Easter and W. J. Long, Portland, and J. G. Bennett, Vancouver.

American Tool Mfg. Company, Portland, Ore., has been incorporated with capital stock of \$25,000 by R. B. Hayden, D. D. Jackson and G. H. Benson.

The Carstens Packing Company, Spokane, Wash., will double the capacity of its plant at a cost of more than \$50,000. Thomas N. Conway, manager, states that construction will begin at once. The old part of the plant will be remodeled and new equipment installed.

The East Oregon Lumber Company, Enterprise, Ore., has started work on additions to its plant which include a 200-ft. extension to the planing mill and an addition to the power plant and office building.

The Burley Milling & Elevator Company, Burley, Idaho, according to C. C. Baker, manager, plans the erection of a five-story flour mill with a capacity of 400 bbl.

P. F. Wilson, Chehalis, Wash., has purchased the wood-working plant of the Clark Brothers Mill at Napavine, and will make a number of improvements and alterations.

The West Waterway Lumber Company, Seattle, has purchased a block of tideland property on the West Waterway, on which it will erect a plant to cost \$100,000. W. A. Whitman, Tacoma, is at the head of the company and announces that construction work will begin immediately.

## The Pacific Northwest

SEATTLE, WASH., April 25, 1916.

For the first time in nearly a decade the lumber industry of the Northwest is operating on a normal basis and the trade looks for a steady demand for their products at profitable prices for an indefinite period. The big plants are running on a 10-hr. a day schedule, with several running 20 hr. a day, to care for surplus orders. Within the last six months the railroads alone have placed orders that will aggregate 10,000,000 ft. The mining industry has also been a good buyer. Trade with South America, Australia and the Orient remains much restricted by the continued scarcity of ocean carriers.

Shipbuilding operations also are increasing, a number of new contracts having been let, and builders of both steel and wooden ships are buying considerable new machinery. The call for metal working tools continues in excess of the supply, and second-hand tools are kept closely cleaned up.

An important gas engine transaction is the acquisition of the Standard Gas Engine Company of San Francisco by the newly organized U. S. A. Engine Company, an Eastern firm, with a capital of \$1,500,000. The plant of the Standard Company on Oakland Harbor will be greatly increased, and the Southwark-Harris Diesel engine in sizes over 100 hp. will be added to its products.

A. S. Kendall of the Kendall Lumber Corporation, Roseburg, Ore., will build a sawmill of 250,000 ft. daily capacity.

The American Can Company has secured a four-acre site at Seattle, and will start work shortly on a new plant which will employ about 500 men.

The Du Pont Powder Company has taken options on a large acreage near Butte, Mont., and is preparing to build a factory for the production of high explosives.

P. E. Roberts & Sons, Weiser, Idaho, has recently been organized, to represent the Avery Tractor Company, and handle a full line of tractors and threshing outfits and other farm machinery.

Officials of the Crown-Willamette Pulp & Paper Company, with main offices in Portland, Ore., state that work will begin immediately on an addition to its mill in Camas, Wash. Office buildings and other structures are to be built during the summer.

The Atlas Foundry & Machine Company, Tacoma, Wash., plans the construction of a new three-story concrete pattern house. Heath & Gove, Tacoma, are the architects.

The Musselshell Valley Grain Company, Forsyth, Mont., announces that work will begin shortly on the proposed 30,000 bu. elevator and 75-bbl. flour mill to be erected at Forsyth.

## Canada

TORONTO, ONT., May 1, 1916.

The T. McAvity & Sons, Ltd., St. John, N. B., recently received an order for munitions and will build an iron and brass foundry on Marsh Road adjacent to the Intercolonial Railway tracks. It will be one of the largest in the lower provinces. The company will spend \$100,000 on the plant the first year and is in the market for the following machinery: Lathes for making 8-in. shells, from 16 to 18-in. single-purpose, and from 24 to 35-in. standard lathes for roughing, finishing and boring, etc.; 36 to 40 drilling machines, banding presses, wave ribbing, tapping, recessing and copper band turning, thread milling machines with complete equipment; also an entire tool-room equipment; machinery for power plant, including a 250 to 500-kw. generator unit, either direct or alternating current; a compound condensing engine, high-speed preferred; eight 25 or 30-kw. motors, etc.

Brennen & Sons, Hamilton, Ont., are in the market for a power axe and saw.

Thomas Shaw, R. M. D. No. 3, Victoria, B. C., will establish a boiler shop in Vancouver, B. C., and is in the market for a 15-hp. motor, air compressor, etc.

The harbor commissioners, Toronto, will build a brick and tile machine shop on the Don Division, near Mill Street, Toronto, to cost \$13,500.

Fire caused \$7,500 damage to the plant of Wilson & Warden, 58 Duchess Street, Toronto, manufacturers of bottlers' supplies, etc.

The White Sewing Machine Company, branch of the White Company, Cleveland, Ohio, has taken over the plant of the Raymond Sewing Machine Company, Guelph, Ont. The new company has been deeded a site of 20 acres and will build a plant there to cost \$250,000. In the meantime, the present plant of the Raymond Company will be used and its capacity doubled immediately. G. A. S. Hedley will be manager and Mr. Carpenter, superintendent.

The Brown Copper & Brass Rolling Mills, Ltd., New Toronto, Ont., is building an addition to its plant for the manufacture of shrapnel shells.

Work will be commenced at once on the erection of a machine shop for the Halifax Graving Dock Company, Halifax, N. S., of reinforced concrete, to cost \$16,000.

The Brandon Company, 108 Vine Street, Toronto, has had plans prepared for a brick and steel machine shop to cost \$5,000.

The school board, London, Ont., will install a boiler at the new technical school and will be in the market for iron and wood-working machinery, electrical equipment, etc.



Price Brothers & Co., Ltd., 56 St. Peter Street, Quebec, will make extensions to its lumber mills at Kenogami, Que., at a cost of about \$200,000. A. Whipple is the architect.

Truro, N. S., will purchase the Chalmers electric plant at Truro and will be in the market for pumps, boilers, engines, motors, generators, blowers, stacks, etc.

The Board of Control, Hamilton, Ont. is calling for bids until May 8 for mechanical rakes and appurtenances for the Gage Avenue pumping station. A. F. Macallum is engineer.

Work is to be commenced at once on the erection of an addition to the plant of the Canada Iron Foundries, Ltd., 7 St. Maurice Street, Three Rivers, Que.

The Michigan Central Railway Company has let the contract for the construction of a roundhouse, coal dock and other buildings at Montrose, Ont., to Wallbridge & Aldinger, Detroit, Mich. The buildings will be of brick and concrete and will cost \$250,000.

The Imperial Realty Company will build a power station on Slater Street, Ottawa, Ont., of brick and concrete, to cost \$30,000.

The Campbell Flour Mills Company, Ltd., Toronto, will build a coopeage plant to cost \$5,000.

W. H. Banfield & Sons, Ltd., Toronto, has been incorporated with a capital stock of \$100,000 by Reginald H. Parmenter, 85 Bay Street; Arthur J. Thomson, 132 Balmoral Avenue; William S. Morlock, 107 Roxborough Street West; and others to manufacture wood-working tools, etc.

The Loudon Machinery Company of Canada, Ltd., Guelph, Ont., has been incorporated with a capital stock of \$250,000 by James E. Day, 26 Adelaide Street West; Joseph P. Walsh, Mount Dennis; Alan C. Fleming, and others to manufacture machinery, barn equipment, hay tools, etc.

The Bruneau, Currie & Co., Ltd., Montreal, has been incorporated with a capital stock of \$100,000 by James A. Robb, James A. McDonald, Salaberry de Valleyfield, Que.; William C. McCullough, Souris, Man.; Charles E. Loy and others of Montreal, to manufacture cereals, flour, etc.

William Hood & Son, 10 Richmond Square, Montreal, are in the market for a trimming press or punch for drop forgings; also a power hammer, either board, belt or steam-driven.

The Volta Mfg. Company, Welland, Ont., is in the market for 20 or 22-in. engine lathe, 10-ft. bed or over.

The Canadian China Clay Company, Montreal, is seeking incorporation with a capital stock of \$1,500,000 to develop kaolin deposits in Amherst Township, Que., and it is expected that a clay-working plant will be constructed at an early date. Alex. Orsali, is president; C. G. DeTonnancour, A. G. Gardner, William Mackenzie, Toronto; Donald Mann and others are in the company.

The Lake of the Woods Milling Company's plant at Medicine Hat, Alberta, was totally destroyed by fire April 28. The loss will amount to \$500,000.

The Dominion Sheet Metal Company, Hamilton, Ont., has received a permit for the erection of an addition to its plant on Burlington Street to cost \$6,000.

Belleville, Ont., is considering the installation of another pump at the pumping station. J. W. Holmes is clerk.

## Government Purchases

WASHINGTON, D. C., May 1, 1916.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, schedule 9568, for one electric welding apparatus for Brooklyn, and two electric welding and cutting outfits for Boston and Puget Sound, respectively; schedule 9573, for one air compressor, f.o.b. works; schedule 9602, one bolt heading, upsetting and forging machine, one convertible shear or punch and two single-end horizontal punches, all for Brooklyn; schedule 9603, one jolt and squeeze ram molding machine, for Norfolk; schedule 9605, one steam drop ram guided hammer, and one hydraulic trimming press, for Boston; schedule 9621, four 16-in. swing wood-working lathes and three 12-in. saw tables, all for Boston; schedule 9622, one planing machine and schedule 9623, one 24-in. turret lathe, one 27-in. surface planing machine and one 36-in. bandsaw, all for Brooklyn.

Whether it would be advisable, pending bankruptcy proceedings, for the trustee of the Dayton Coal & Iron Company to resume operations at the furnace plant will be reported to the United States Court at Chattanooga, on May 11, by a creditors' committee. Trustee W. B. Allen reported that only one offer for a portion of the property was worth considering. The trustee was instructed to have the furnaces and coke ovens overhauled.

## Judicial Decisions

ABSTRACTED BY A. L. H. STREET

**VALIDITY OF CONDITIONAL SALE CONTRACT.**—An engine or other machinery sold for installation in a manufacturing establishment does not become a part of the real estate until it has been set up and permanently attached thereto. And where such machinery is sold under a contract reserving title in the seller until payment of the purchase price, it does not become subject to a mechanic's lien asserted by a third person against the real estate, although the contract may not have been recorded before the mechanic's lien claim accrued or before the machinery was delivered at the building, it being sufficient that the contract was recorded before the machinery was set up. Machinery is not made a part of real estate by merely depositing it thereon. To change the machinery's character as personalty it must be permanently affixed to the real estate. (Kansas Supreme Court, *St. Mary's Machine Company vs. Iola Mill & Elevator Company*, 155 Pacific Reporter, 1077.)

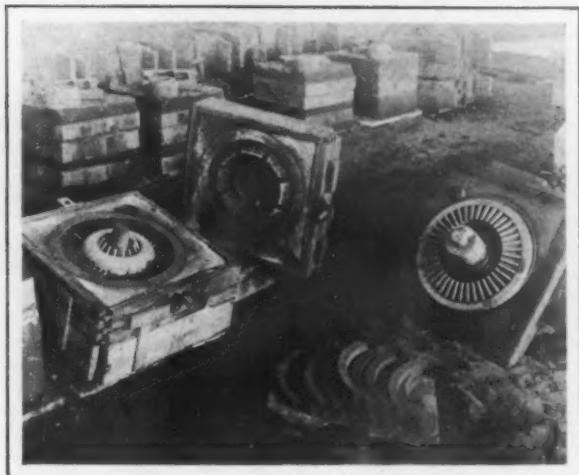
**RIGHTS UNDER COMMISSION SALES CONTRACT.**—An agent employed to sell goods on commission is entitled to rescind the agreement on discovering defects in the goods affecting their marketability, but he may not enhance his recoverable damages for the seller's failure to furnish sound goods by continuing under the contract for several months with knowledge of the seller's default in this respect. (Washington Supreme Court, *Kennedy vs. Mellicke Calculator Company*, 155 Pacific Reporter, 1043.)

**CONTRIBUTORY NEGLIGENCE OF MACHINE OPERATOR.**—Contributory negligence bars recovery for injury to a child 16 years old employed in a can factory, resulting from her negligently permitting her foot to rest on the treadle of the machine she was operating, causing a die to descend on her thumb. (Louisiana Supreme Court, *Dalberni vs. New Orleans Can Company*, 71 Southern Reporter, 214.)

**SCOPE OF STATE LAWS AFFECTING SALES.**—A transaction is of strictly interstate character and hence is not subject to State laws governing foreign corporations doing business in a State, when an agent of a foreign corporation exhibits a sample machine to a customer, and on receiving an order addressed to the home office, satisfactory to the company, a machine is shipped from the factory, either to the customer or to the agent within the State to be delivered to the customer. (Virginia Supreme Court of Appeals, *Dalton Adding Machine Company vs. Commonwealth*, 88 Southeastern Reporter, 167.)

**BUYER'S RIGHTS AGAINST EXCESSIVE SHIPMENT.**—A buyer of steel bars would have been justified in refusing to accept a shipment on account of excessive length of some of the bars, involving an increase of the contract cost of more than \$300 on an order calling for not more than \$4,000, but, having refused to receive the shipment on the sole grounds that the seller's agent practiced fraud in obtaining the order and that the buyer's representative was not authorized to give the order, the buyer waived any right to resist suit brought by the seller on the contract of purchase on the ground of the excess in quantity of steel tendered for delivery, that objection having been first made shortly before trial of the suit. (United States Circuit Court of Appeals, Ninth Circuit, *Neumeyer vs. Polson Logging Company*, 229 Federal Reporter, 705.)

**SCOPE AND VALIDITY OF MORTGAGE.**—A mortgage of property of an iron company does not cover cash on hand, commissary stock, iron ore, pig iron, etc., where the mortgaged property is described as mineral lands, furnaces, etc., and "all property and estate wherever situate." The quoted phrase will be interpreted as including property only of the same general kind as that specifically described. A mortgage covering goods kept for sale is void as against the mortgagor's general creditors when it gives him power to dispose of the mortgaged goods in the regular course of his business. (Tennessee Supreme Court, *Morgan Brothers vs. Dayton Coal & Iron Company*, 183 Southwestern Reporter, 1019.)



Pattern, Ring Cores, Cope and Drag Molds for 15-in. Tractor Bevel Gear Having 40 Teeth

### Machine Molding in a Jobbing Steel Foundry

(Continued from Page 1051)

centrally divided by a swinging steel plate shield which is suspended from a steel framework. On the one side the chippers are cleaning up the burrs and fins on the castings received after the grinding. When finished they shove the castings through to

### DAILY MELTING DEPARTMENT REPORT

The daily melting department report, kept on a broad sheet for each month, gives the following information on a line for each day:

Cupola charge: Three columns for standard low phosphorus iron, such as Robeson, Cranberry and Lebanon, say 50,000 lb. of the last; 10,000 lb. Bessemer pig; 5000 lb. spiegel; 20,000 lb. springs; 20,000 lb. of knuckles; 5000 lb. shop scrap; 200 lb. of 80 per cent manganese.

Converter: Total cupola charge, 110,200 lb.; 1000 lb. 50 per cent silicon; 500 lb. of 10 per cent manganese; 1000 lb. 80 per cent manganese; 25 lb. vanadium; 25 lb. aluminum; 200 lb. titanium; 2750 lb. total additions.

Total metal charged: 112,950 lb.

Spills and skulls: 3000 lb.

Coke: 10,000 lb.

Limestone: 4000 lb.

Ganister: 4000 lb.

Silica grits: 2000 lb.

Blows: 23.

the opposite side for inspection, the curtain swinging to let the casting through but preventing flying chips from injuring the inspector. The tumblers are motor driven, and were furnished by the W. W. Sly Mfg. Company and the Whiting Foundry Equip-



Patterns and Molds for the Wheels of the Jeffery Quad Motor Truck. One Mold Is Shown with Cores Set

ment Company. They are operated at a speed which gives a luster finish to the castings. In unloading the mills the castings are discharged into a chute to the sorting floor shown in one of the illustrations. For handling the heavier castings in the cleaning room a 3-ton overhead crane is installed, serving the entire floor space.

In the accompanying illustrations are shown typical examples of interesting work being done in this foundry. These are instances of the heavier class of work, the foundry limiting itself in general to a maximum of 1500 lb. The foundry floor space is perhaps equally divided between snap flask work for the smaller pieces and work of the character illustrated. In connection with the snap flask molding a device for the economy of floor space has been adopted which has an application in any foundry. The molds as they are made are laid in a row on a long channel, about 15 in. in width, the back of the channel facing up. When the entire length of the channel is filled with molds, the whole thing is picked up by the crane and moved over to a more convenient pouring floor, leaving the space near the molding machines open for the next lot of molds. Also when the smaller castings are shaken out at the far end of the foundry, they are piled on a large cast-iron grid, which is then picked up by the crane and carried to the cleaning room, a method which largely eliminates the trucking problem.

The bevel tractor gear shown has 40 teeth, a face

Form 20 2M-5-15		DATE		PATT. NO.	
CUSTOMER		DATE		PATT. NO.	
Tentative Molding Cost Per Ton		Tentative Cost		Castings Wgt. Pcs. per Mold	
Final Molding Cost Per Ton		Total Cost		Ordered	Molded
Decrease		Increase		Wgt.	
Cleaning		Cores		P. W.	
H. & O.		Average		S. W.	
Weight Castings Sold		Final Cost \$		Total Molding Cost	
Cost of Order \$		Selling Price \$		Final Molding Cost Per Ton	
Sales Value of Order \$		Profit on Order \$		Weight Castings Per Mold	
Loss on Order \$		Profit Per Mold Per Day \$		Weight Metal Per Mold	
				Average H. & O. % Actual H. & O. %	
				Daily Prod. Molds	
				Weight	
				Molded	
				Beach	
				Squeamer	
				Actual	
				Estimated	
				Cast	

Daily Record of Production Card

diameter of 15 in. and is cast integral with a hub and clutch measuring 14 in. from face of gear to top of clutch. The piece weighs 60 lb. The pattern includes the gear and hub pattern, the core print for the circular cores which are placed around the periphery of the gear and the core print for the gate core. A flask 20 x 20 in. is used. The view shows the pattern placed on the board ready for the making of the drag mold which is rammed on a jolt machine using a horn gate. To make the other half of the mold, the gear pattern is reversed on the board, the hub pattern set on and on top of it the core print for the clutch core. The core print for the circular cores is fastened to the board and holds the gear pattern centrally. The whole is then rammed up by hand in a cheek with a stick gate to connect with the drag gating. The clutch core is then substituted for the core print and the mold is ready for pouring. One molder can put up an average of 16 per day.

Another of the illustrations shows the 36 x 6-in. wheels cast for the Jeffery Quad trucks that were supplied for the United States Army in Mexico. These wheels have a cored section with a metal thickness of only 5/16 in. and weigh in the rough 235 lb., being machined to a finished weight of 185 lb. The character of the patterns and molds which

are made up in a 36 x 36-in. flask is pretty clearly indicated in the reproduced photograph. Both cope and drag are rammed on a jolt machine and a molder and two helpers have turned out 40 wheels a day working in three shifts. An interesting illustration of the expedition with which the foundry worked in connection with the rush order placed for these trucks by the Government is had in the fact that the Jeffrey Company, telephoning its order on Saturday morning, received its initial shipment of nine castings on Wednesday and at the rate of 25 a day until the completion of the order.

Another example of an unusual machine-molded steel casting is a tractor steering fork, weighing 60 lb., 33 in. long, having an overall dimension across the fork of 13½ in. and a span of 10 in., with a minimum metal section of 5/16 in. Both the drag and cope molds were rammed on a jolt machine.

For the following of the work through the foundry, a simple system has been developed. When an order is to go out to the foundry the card here reproduced is made out in the office and sent to the pattern storage vault. Here the desired pattern and core boxes are located by number, the order card attached, the detachable portion going with the core boxes, if any, and the patterns placed with the others ready to be taken to the foundry. When

[illegible]

### The Order Card to the Foundry

the work is to go through in regular order the card is white, if the order is to be rushed the card is red and when an express shipment is desired or a trial casting to be made, the card is yellow. This card then stays in the foundry until the job is completed.

A clerk from the office who makes up the time slips of the molders enters each day the daily record of production on the card showing the progress of the work, and brings the time slips back to the office for the making up of the payroll, which is kept to the close of each preceding day. The molding is done almost entirely upon a piece work basis, and this daily posting up of the wages earned is of especial advantage at this time, in determining the fact that every man is earning all that the job should permit. When the job is completed and a full record is on the order card, it serves as a basis for making up the permanent cost record, which is a permanent reference file.

An accurate and continuous record of the raw material consumption is also made in accordance with a form here indicated in a general way. This acts as a check not only against invoices, as to weights billed, but also checks against the daily summary of the status of operations which is made up not as here shown, but in the form of a wide



Snyder 1-Ton Electric Furnace Which Will Be Operated for Producing Small Basic Steel Castings

blank with a horizontal line for every day in the month.

In its attention to matters affecting the safety of its employees this company has been particularly progressive. It has a safety organization and a special room which overlooks the foundry for regular meetings of its safety committee. Dangerous machines are carefully guarded and an interesting

## DAILY SUMMARY

The daily summary is tabulated on a monthly sheet. The different columns, with comparative figures, are as follows:

Current sales: \$10,000.

Current shipments: 50,000 lb.

Average selling price: \$208.

Bank balance: \$20,000.

Accounts receivable: \$100,000.

Accounts payable: \$25,000

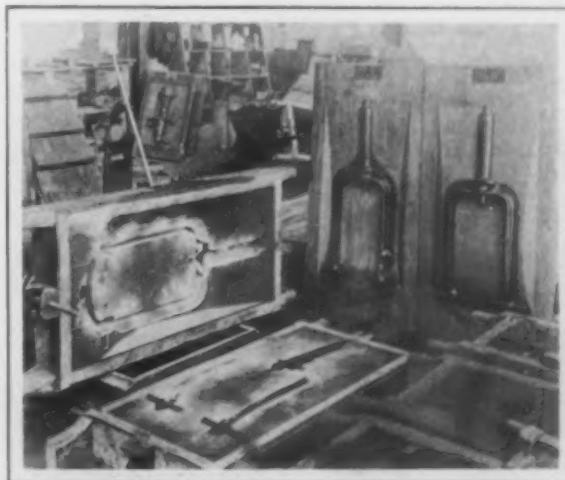
Labor: Molding, 50; cleaning, 80; cores, 20; melting, 10; common, 100; total, 260.

Production: Charge to-day, 100,000 lb.; charge to date, 100,000 lb.; good castings, 25.2 tons; monthly rate, 800 tons.

Shipped: To-day, 50,000 lb.; to date, 50,000 lb.

Average weight of castings: 25 lb.

Number of castings shipped: To-day, 2000; to date, 2000.



The Patterns and Molds for a Tractor Steering Fork. Cope  
Pattern at the Right





REMBINGTON ARMS AND AMMUNITION COMPANY									
BRIDGEPORT WORKS									
POWER DEPARTMENT									
SUMMARY					For				
					Ending				
					191				
1	Total Kilowatt Hours generated, gross				35	B. T. U. per pound dry			
2	Kilowatt Hours used in Station				36	Heat Carbons			
3	" " " " " " " "				37	Volatiles Matter			
4	Total Kilowatt Hours from R.M.C. Co.				38	ash			
5	" " " " " " " "				39	Sulphur			
6	" " " " " " " "				40	Moisture			
7	Off-peak Load				41	ash removed			
8	Maximum 2 Hour Load				42	Coal fired	Lbs.		
9	" " " " " " " "				43	Coal Received	Lbs.		
10	" " Capacity Peak				44	Circulating Water Injection Temp.	°F.		
11	Ratio of Average Load to Maximum Hour				45	" " " "	" "		
12	Generator Hours Service				46	Average Vacuum	"Hg.		
13	Kilowatt Hours per Generator Hour				47	Barometer	"Hg.		
14	Excitation				48	Outside Temperature	°F.		
15	L. T. Power for Factory				49	Weather			
16	Active Boiler Hours				50	Hot Water, Laundry, out.	Gals.		
17	Idle " "				51	" " " " Make-up	Gals.		
18	Number of boilers on peak				52	" " " " Temperature, out	°F.		
19	Total high pressure steam made				53	" " " " " "	" "		
20	" " 15 lb. Pressure Steam				54	Heating System Circulation	Gals.		
21	" " H.P. Steam to Arms Works				55	" " " " " "	" "		
22	High Press. Steam to Hot Fire Plant				56	" " " " " "	" "		
23	Average " " Pressure, Hds.				57	" " " " " " Fire Plant	Gals.		
24	" " Superheat, Hds.				58	Cold Water Pumped	Gals.		
25	" " Steam pressure, Factory				59	Steam to Compressors	Lbs.		
26	" " Superheat, Factory				60	Compressed Air	Cu. Ft.		
27	" " Pressure Ste. Pt.				61	City Water	Cu. Ft.		
28	" " Heater Rdy Before				62	Drinking Water, out	Gals.		
29	Water Feed Temperature				63	" " " " " "	" "		
30	Make-up Temperature				64	" " " " " "	" "		
31	City Water Temp.				65	" " " " " "	" "		
32	" " " " " "				66	Coal per Boiler Hour	Lbs.		
33	City Water Temp.				67	Water " " " "	Lbs.		
34	Average Flue Temp.				68	Gas to Factory	Cu. Ft.		

Besides This Blank There Is a Heat Analysis Blank, with Identical Ruling for the Same Number of Items and These and the Engine Room Log Are All of the Same Size—8½ x 11 In.

drop by failure of the current supply, at a given point the turbine will automatically take up the load and keep the exciter in service.

At the opposite end of the basement are two Ingersoll-Rand steam-driven cross-compound air compressors, each with capacity of 1500 cu. ft. per minute. A third unit is now being installed. The air is compressed to 100 lb. pressure.

One side of the basement is divided into four bays by the compartments housing the three forced-draft fans. These 180-in. fans are driven by Sturtevant compound vertical engines. In one bay are three turbine-driven centrifugal pumps, each with capacity of 2500 gal. per minute, for circulating hot water through the plant heating system. One unit is held in reserve. The water is heated by process steam in three 2500-gal. service heaters located above the rear of the boilers, its temperature being controlled by thermostats. The heating of all parts of the plant, except the forge shops, is designed for maintaining a temperature of 70 deg.

In the second bay are two volute pumps of 300-gal. capacity each. These are turbine-driven and supply hot water at a temperature of 150 deg. to the factory lavatories and the restaurant kitchen. In this bay is also a 1500-gal. turbine-driven pump, which, in connection with three 500-gal. volute pumps, driven by 35-hp. motors, located in the last bay, furnishes cold water for factory purposes. Drinking water is supplied from a 15-ton refrigerating plant by a centrifugal pump driven by a 7½-hp. induction motor. A 35-hp. motor drives the ammonia compressor of the refrigerating plant. The drinking-water plant is located on the opposite side of the basement.

Two two-stage turbine fire pumps, each with capacity of 1000 gal. per minute, against 100-lb. pressure, are located in the third bay. These are driven by two 100-hp. turbines and draw from the cooling pond. The water for factory and fire service is stored in two 100,000-gal. steel tanks mounted on high steel towers just outside the power plant. There are six pumps in the last bay. Three of these are the cold-water pumps previously mentioned. The other three are three-stage boiler feed pumps with capacity each of 300 gal. per minute, against a pressure of 250 lb. They are driven by 80-hp. turbines.

Much care has been exercised to make each piping system flexible and inter-communicating. A large piping tunnel runs from the power plant to the main building with branches each way to the forge shops. These tunnels contain all the pipes except gas. Workmen in the tunnels are protected by automatic stop valves in the high and low-pressure mains, which are operated either by a break in the main or by any sudden drop in pressure. In each machine unit of the main building is a piping tower carrying all pipes common to each unit. Other pipes are carried up on the inside walls. The service heating coils are located under the windows and radiators are installed only in the offices.

There is a uniform system of steam, air and other piping mains in each unit of sufficient capacity so that the use of the units can be changed without necessitating seriously disarranging the piping. The first cost of this installation is higher but the ultimate cost is much less. When present plans are carried out, oil for quenching purposes in heat treatment will be circulated about the plant, being cooled at a central point. Each turbo-gen-

erator has a self-contained oiling system and an oil filter and storage is installed in the power plant for periodic refreshing of their oil supply.

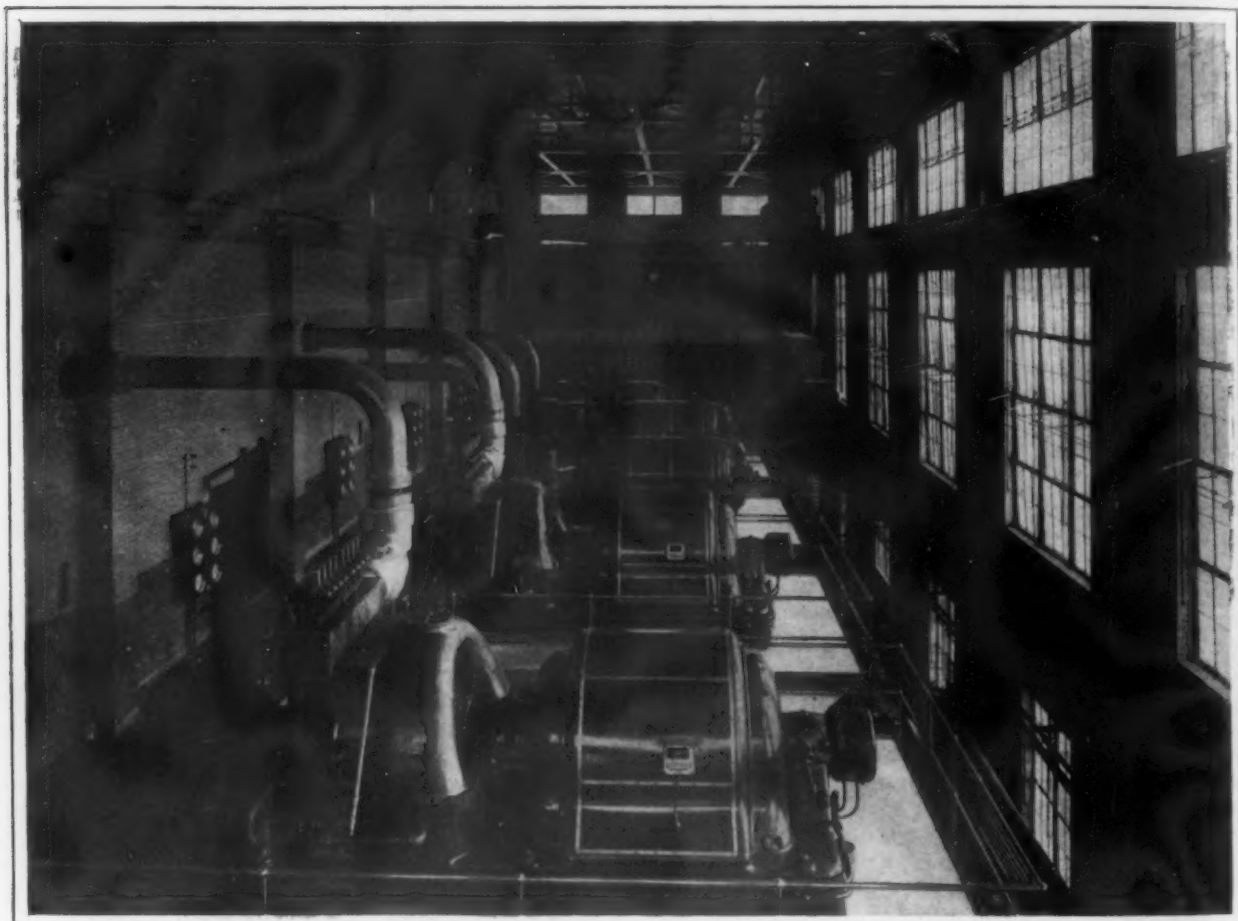
The main distributing switchboard is located at one end of the turbine floor. It has five generator panels, three exciter panels and one station panel. The feeder and lighting sections are each divided into two parts, one serving the arms plant and the other the cartridge plant. There are eight transformer houses at the arms plant, the usual grouping being to have one transformer house serve two main units and one forge shop. The largest houses have three transformers with total capacity of 1500 kva. for power and three 75-kw. transformers for lighting.

To describe adequately the extensive mainte-

### Loss of Heat Through Pipe Covering

A notably extensive series of tests to determine the efficiency of pipe coverings in preventing loss of heat was conducted by the Armstrong Cork & Insulation Company at its plant at Beaver Falls, Pa. These tests included bare pipe, four standard makes of 85 per cent magnesia pipe coverings and the company's Nonpareil high-pressure covering.

The tests were made in a well-insulated room, 6 ft. wide, 8 ft. high and 25 ft. long. The testing apparatus included a 3-ton refrigerating machine, a 15-ft. length of 8-in. pipe blanked off at each end with a cap and set up on wooden supports inside the testing room. The pipe was supported so that it sloped upward to prevent air pockets from forming, and at the upper end there was a  $\frac{1}{2}$ -in. inlet at the bottom of the pipe, while at the other end at the top was an outlet of the same size.



The Turbine Room Looking from the Power Plant Office

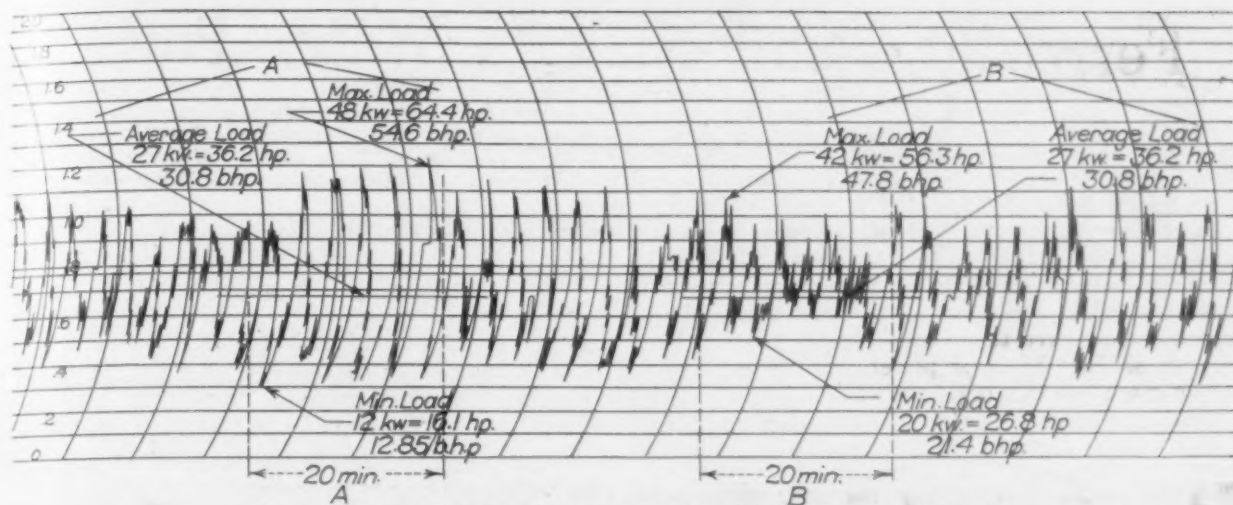
nance and inspection of equipment, piping, wiring, etc., the correction of troubles and the handling of trouble reports, and the interesting points of the office routine and the filing system, would stretch this article beyond its allotted space. Its main purpose will have been served if it has made clear how successfully the Remington power department has striven, as tersely stated by R. J. S. Pigott, power superintendent, "to put salt on the tail of every B.t.u. it can lay hold on."

In a recent interview Aemilius Jarvis, president Canadian Locomotive Company, Kingston, Ontario, said: "The company has orders on hand that will keep the plant working at capacity for at least a year, and the outlook for new orders is particularly bright. We are now turning out 15 new locomotives a month; this in addition to our own work on munitions. The one difficulty we are experiencing at the present time is that of securing materials. These are very scarce, with consequent high prices obtaining."

Hot water flowed into the pipe by gravity, and when the tests of the coverings were being made the entire length of pipe was covered with the material under test. Thermometers were placed in the pipe  $2\frac{1}{2}$  ft. from each end, so that the bulb came at about the center of the pipe. This distance was chosen to give a 10-ft. length of pipe for testing and that the supports might be outside of this portion. The temperature of the room, which was cooled by brine pipes hung along one side, was indicated by two thermometers, one on either side of and hanging about on a line with the pipe. A baffle plate, extending from approximately 6 in. above the floor to within the same distance of the ceiling, was placed in front of the coil to prevent direct radiation and to insure circulation and uniform temperature throughout.

In making the tests the refrigerating machine was started and hot water allowed to flow through the pipe. When the conditions became constant the hot water was circulated continually through the pipe and the room kept at a predetermined temperature for 24 or 48 hr. before the readings were taken. The temperature of the testing room was kept constant during each





ONE OF THE MACHINERY POWER TESTS AT REMINGTON PLANT

Load Curve of Grinding Machine Drive. There are 12 Hemming grinding machines in this drive, each having a 1 1/4 x 16-in. cup wheel operating at 625 r.p.m. The work feed is 1 ft. per min. The machines are arranged in groups of six, each group operated by one man. The method of operation and the rate of feed are such that the power demand gradually increases to a maximum when all six machines are operating simultaneously, and then gradually decreases to a minimum when the machines have finished grinding.

The two portions of the load curve marked A and B indicate the variation in power demand under two different conditions of operation. During the period marked A the relative operation of the two groups was such as to cause their load to be exactly in phase. During the period marked B the two loads were 90 deg. out of phase. As shown on the curve, there is a marked difference in the power demand for the two conditions.

With loading A the average power is 30.8 hp., which is less than the rated output of the motor, 35 hp. The peak load is 54.6 hp., which is well within the maximum overload capacity of the motor. The minimum load is 12.85 hp.

The average power with B operation is 30.8 hp., the same as for A; the work done in each case being practically the same and the periods equal (20 min.). The variation in power demand is considerably less and approaches the ideal condition of a uniform load of 30.8 hp.

With intelligent operation, as in B, excessive current variation is obviated and higher operating efficiency is obtained. Most important of all is the lessened possibility of interruption of service due to tripping of the overload relays with excessive overload. When selecting a motor to drive these machines, care must be taken to see that the maximum overload capacity of the motor selected on an average power basis is greater than the sum of the loads imposed by all the machines.

test, and the temperature and amount of hot water were maintained as nearly uniform as possible. The thermometers were read every 15 min. through windows in the test room, and the hot water flowing through the pipe was caught and weighed. The reading of the hot water outlet thermometer was of course lower than that of the inlet, the difference being due to the heat lost by the hot water in passing through the pipe between the two instruments. All of the water was brought into contact with the bulbs of both thermometers by a series of baffles in the pipe.

At the expiration of each test the average temperature difference between the inlet and outlet thermometers in the pipe and the average difference between the hot water and the air in the testing room were determined and the number of pounds of water flowing in 24 hr. ascertained. The surface area of the bare pipe being tested and the area at the mean circumference of the covering were also determined. The heat loss per square foot per degree difference in temperature for 24 hr. measured in B.t.u. was calculated by multiplying the difference in temperature between the two ends of the pipe by the quantity of water flowing in 24 hr. and dividing this result by the product of the average difference in temperature between the outside air and the water and the surface area of the pipe. To reduce the results to a standard basis such as the loss per square foot at the mean circumference per inch of the thickness per degree difference in temperature for 24 hr., the area in square feet at the mean circumference of the covering was substituted for the area of the pipe and the result multiplied by the thickness of the covering in inches.

In all thirty-five tests were made and the results are summarized in the following table:

Material	Heat Transmission, B.t.u.
Nonpareil high-pressure covering.....	7.363
Brand No. 1, 85 per cent magnesia covering..	8.020
Brand No. 2, 85 per cent magnesia covering..	8.473
Brand No. 3, 85 per cent magnesia covering..	8.310
Brand No. 4, 85 per cent magnesia covering..	8.452
Bare pipe .....	51.070

The figures given in the foregoing table are per square foot at mean circumference per 1-in. thickness

per degree difference of temperature for 24 hr., with the exception of the last, which is per square foot of pipe surface. The Nonpareil covering and brands Nos. 2 and 4 of the magnesia covering were each 1 1/4 in. thick, while the two remaining brands of magnesia covering were 1 in. thick.



Firing Aisle, Remington Arms Power Plant

# Ferroalloys and Niagara Water Power\*

## The Remarkable Development in Electric Furnace Products on Which American Industries Are Increasingly Depending

BY F. J. TONE

The development of Niagara power in 1895, only 20 years ago, marks the beginning of the electric furnace art. It stands to-day as one of the big factors in our industrial life. Up to 1895, when Charles M. Hall came to Niagara, the aluminum industry depending on steam power had given little promise of commercial success. Its almost incredible development during 20 years has been due to the impetus of Niagara power, and its future magnitude no one dares to predict. Dr. E. G. Acheson with a 150-hp. furnace operated by electric power generated from steam had made a commercial failure of carborundum. Coming to Niagara in 1895, he was at once enabled to found the artificial abrasive industry. Willson, the inventor of calcium carbide, was working at Spray, N. C., with a 200-hp. furnace. To-day we have 12,000 to 15,000-hp. furnaces making almost as much carbide in one day as the former furnace produced in a year.

With the technology of these great industries, aluminum, calcium carbide, cyanamid, abrasives, ferroalloys, silicon and graphite we are all familiar, but few realize their economic importance or to what an extent the industrial and metallurgical arts are indebted to Niagara power for their development, especially at this time, when we are taking stock of our industrial assets and determining how the nation can best make itself industrially self-contained.

### FERROSILICON

The manufacture of steel is the greatest of all American industries, and its dependence on Niagara power is strikingly illustrated by a study of the ferroalloy industry. In 1915 the estimated production of finished steel in the United States was 28,000,000 tons, and in a major portion of this there was employed as the chief deoxidizing agent high-grade electrically produced ferrosilicon. This alloy is used in practically all steel manufactured by the basic open-hearth process, which in recent years has so far supplanted the Bessemer process as to account for more than 70 per cent of the total production. To a lesser extent electrically produced ferrosilicon is used in almost all the other processes of steel manufacturing.

The steel-casting industry finds high-grade ferrosilicon practically indispensable for eliminating blowholes and producing sound castings. The cast-iron foundry industry has in recent years realized the advantages of the use of this alloy, and progressive establishments now depend on it for a control of their castings.

Niagara Falls is the home of ferrosilicon in the United States, and up to the present time the total domestic production has been made from Niagara power. For a short time prior to the European war some ferrosilicon was imported, but a large portion of this was produced by Niagara Falls power in Canada. The Canadian producer has, since the war began, been compelled by government order to export ferrosilicon to countries other than the United States, thus increasing an existing unprecedented demand for the domestic product and causing a power famine on the American side of the Niagara River.

This fact has a significant bearing, not only on the inadequacy of the total supply of Niagara Falls power, but on the regulations which govern the importation of electrical energy into the United States. A cessation

of the supply of ferrosilicon would be nothing short of a calamity to the steel business, and when we further consider that specifications for shell steel for munition purposes call for 0.20 to 0.30 per cent silicon, we see the rôle ferrosilicon plays in munition manufacture and the realization of our own program of preparedness.

### FERROCHROMIUM

The essential element in the manufacture of successful armor-plate and armor-piercing projectiles is introduced into steel by ferrochromium. Without this alloy not a battleship could be provided with protective armor nor a coast defense gun served with modern projectiles. More than one-half of that now consumed in the United States is produced at Niagara Falls. Ferrochromium likewise enters into the manufacture of automobile steels, steels for jaws, balls, linings of crushing machinery, dies and a variety of special steels.

Sir Robert Hadfield has compared the striking energy of an armor-piercing projectile with that of a modern express train. He states that a 14-in. (35 cm.) projectile weighing 0.62 ton and fired so as to pierce 12-in. (30 cm.) armor plate at a distance of eight miles (13 km.) must have a striking energy of 30,000 foot tons (9000 m. tons) and a striking velocity of 1700 ft. (510 m.) per second, or twice the energy of a modern express train running at 40 miles (67 km.) per hour. The shell has 1/8000 the bulk of the train, and the metallurgist has been able to provide a shell having a steel point of such quality that it delivers this concentrated energy upon the hard-faced plate and passes through it without suffering deformation. This is a striking metallurgical achievement, but it is the electric furnace and ferrochromium that have made it possible.

### TUNGSTEN-VANADIUM-MOLYBDENUM

These alloys are made in part from Niagara power, and when made elsewhere there is largely used as a reducing agent metallic aluminum, also a Niagara product. They form the chief constituents of a relatively high-priced group of products representing an annual production of several millions of dollars, and which in conjunction with chromium are absolutely necessary in the manufacture of high-speed tool-steel, magnet-steel, certain gun-steels, and a variety of special steels. High-speed steel furnishes a most striking example of the dependence of the metal-cutting industries on products of Niagara power. To one familiar with machine-shop practice under the limitations of carbon steel, where it was necessary to maintain a cool cutting edge, it is amazing to see a 17-in. (43 cm.) forged shaft destined for some battleship revolving at a surface speed of 30 ft. (9 m.) per minute, the tool of high-speed steel working at red heat, and chips 1½ in. (4 cm.) wide and ⅝ in. (1.4 cm.) thick coming off, colored a deep blue. Ferrochrome and the other alloys of this group have made this possible. High-speed steel has tripled the capacity of every machine shop in the world and the efficiency of every workman. It has cut to one-third the capital invested in tools to accomplish a given volume of work.

Considering the metals or alloys of chromium, tungsten, vanadium and molybdenum as a group, it may be positively stated that in the absence of these products we should not be in a position to build modern battleships, guns, submarines and many other machines necessary for the nation's defense, to proceed with thousands of operations involving the cutting of metals at a rate comparable with the present or neces-

\*From a symposium on Niagara Falls Power and American Industries read at the annual spring meeting of the American Electrochemical Society at Washington, D. C., April 27, 1916. The author is works manager of the Carborundum Company, Niagara Falls, N. Y.



sary to successfully meet foreign competition. A goodly proportion of our steel and metal working industries, mining operations and scores of other industries would find themselves in the condition of practically twenty years ago.

#### FERROTITANIUM AND SILICON METAL

Titanium, as a ferrocenon-titanium alloy, is employed in a large tonnage of steel made by the Bessemer and open-hearth processes, as well as in the production of steel and iron castings. The aluminum bronze and other nonferrous alloy industries are being greatly benefited by the use of titanium alloys.

A special steel of great importance to electrical industry is silicon steel, used in electrical transformer construction and all alternating-current apparatus. Silicon metal and 75 per cent ferrosilicon essential in its manufacture are produced only at Niagara Falls. The ageing of transformer steel has long been the cause of a serious falling off in efficiency. This loss often doubled after a few years' use. Silicon steel does not age. Moreover, its original hysteresis loss is 25 per cent less than that of the old type of steel. The saving in a large generating and distributing system from the generator through step-up and step-down transformers to the motor may be as high as 6 per cent. Thus silicon steel, a comparatively unknown product, is saving many millions of dollars annually wherever electric energy is transformed.

Silicon metal as a "preparedness" product is important in the generation of hydrogen for aeronautical purposes. In conjunction with caustic soda it forms the cheapest method of generating hydrogen in the field or on shipboard when portable outfits are required.

#### ALUMINUM AND ABRASIVES

The manufacture of aluminum is the largest of the electrochemical industries in point of power consumed and value of product. Commercial development was made possible by Niagara power, and Niagara Falls was for many years the only seat of the industry. Even with the prodigious increase in production the scarcity of aluminum is to-day very acute and is regarded by automobile engineers as little less than a calamity.

The electric furnace abrasives, carborundum and alundum, are fundamental elements in the metal-working industries. They have revolutionized the methods of finishing machine parts, just as high-speed steel has revolutionized the art of shaping metals by cutting. Artificial abrasives have been gradually displacing natural emery and corundum, until in 1914 they constituted 62 per cent of the total abrasives used in the United States. The natural abrasives have practically all been imported, and comprise Turkish and Grecian emery. With the beginning of the war mining in Greece and Turkey ceased and artificial abrasives have been called on to supply the whole field. There are five plants making artificial abrasives from Niagara power, three of which are on the American and two on the Canadian side of the river.

The great metal-making industries making agricultural implements, locomotives, cash registers, electrical machinery, firearms, flour-milling machinery, paper machines, automobiles and all castings of steel, iron and brass are entirely dependent to-day for an adequate supply of grinding materials on Niagara power. As a simple example, take the automobile industry. The mechanical perfection of the modern automobile and the interchangeability of parts have been made possible only by the development of the grinding machine and the grinding wheel.

Cut off the artificial abrasives and force the automobile manufacturer to go back to the grindstone, at the same time eliminating the other products of Niagara power, aluminum, high-speed steel and special steels, and we would see a works which now produces 500 cars per day reduced to an output of considerably less than 100 cars, with the same force of workmen and the same plant equipment. This would mean such an increase in price that there would be no automobile industry on its present existing lines.

Manganese steel, one of the unique materials of

engineering, was little known fifteen years ago. To-day the output in frogs and switches, burglar-proof safes, dredges, gears and rolls represents many millions of dollars. No steel tool will cut it. Without grinding wheels to shape and fashion manganese steel it would still be a metallurgical curiosity.

#### CALCIUM CARBIDE AND ARTIFICIAL GRAPHITE

This electric furnace product is the only commercial source of acetylene, important in its application to the oxy-acetylene cutting and welding of metals. A cessation in the domestic production of calcium carbide would entail enormous loss.

Calcium carbide is also the material from which is produced calcium cyanamid, a most important compound to-day in the field of fixation of atmospheric nitrogen.

Artificial graphite is an electric furnace industry that owes its inception and entire development to Niagara power. The production, which totals several thousand tons annually, falls in two general classes, electrodes and powdered graphite.

Graphite electrodes are used exclusively as anodes in all electrolytic cells for the production of caustic and chlorine. They are a fundamental requisite of this vast industry. With the supply of platinum cut off they are now replacing this expensive metal as anodes in the electrolytic chlorate processes. Graphite electrodes are extensively used in electric smelting and refining furnaces, producing high-grade steel, alloy-steels, ferroalloys, copper, zinc and nickel.

All the manufactured graphite used in the world is produced at Niagara Falls. It occupies a field of its own, which cannot be filled by natural graphite, and it is another striking illustration of the electric furnace "going nature one better."

Thus we see that the electric furnace is not merely a new metallurgical tool, but an important element in our economic life. When future generations begin to shiver for want of coal and to starve for want of nitrogen, the present generation will be remembered not as champions of the preservation of scenic beauty, but as champions of the ugliness of wasted resources.

#### Chain Belt Company Insures Employees

The Chain Belt Company, Milwaukee, Wis., recently sent to its employees the following letter, signed by its president, W. C. Frye. The plan it outlines contemplates that all employees who have been in the service of the company for two years will be given an insurance policy of \$1,000 and those who have been in its employ for one year will receive a policy of \$500.

In order to show our appreciation of loyal and efficient service, I have been instructed by the board of directors to announce that Chain Belt Company has contracted with the Equitable Life Assurance Society to insure the lives of those between the ages of 21 and 65 who had been in our employ continuously for one year or more on April 20, 1916, for the sum of \$500 each and those who had been in our employ continuously for two years on April 20, 1916, for the sum of \$1,000 each. In the case of the employee who has been with the company for one year a substitute certificate for \$1,000 will be given her or him when the term of continuous employment will have reached the two year period. All new employees over 21 years of age will receive a certificate for \$500 upon completing one year's service. In the event of an employee leaving the company's employ the insurance, of course, expires automatically.

This is term insurance and is given without charge, and in the event of death while the policy is in force the beneficiary named will be paid the amount of the policy by the insurance company. It will be issued for the year ending April 20, 1917, but it is our intention to renew from year to year, unless in the judgment of the board of directors it shall prove unsatisfactory or experience suggests amendment. The insurance company is now preparing the policy and making out individual certificates of insurance, which will be delivered in a few days.

The officers of this company are not only interested in you and the women and men in our employ, but also in the welfare of those dependent on you, and feel that in this manner they can show that interest to be real and substantial. We sincerely hope the cordial interests existing between us will long be continued.



## NEW TRADE PUBLICATIONS

**Plates, Sheets and Roofing.**—La Belle Iron Works, Steubenville, Ohio. Booklet. Lists a line of open-hearth plates and sheets with the limiting dimensions that can be rolled in different gages. Illustrations of the various kinds of roofing and siding that can be supplied are presented with tables of weights and brief specifications. A number of sheet bundling tables and other tables of useful information are included.

**Portable Floor Cranes and Hoists.**—Canton Foundry & Machine Company, Canton, Ohio. Catalog. Lists a line of floor cranes and hoists of the portable variety. After a brief description of the construction and operation of the crane illustrations and condensed specifications of the different styles are presented, the engravings in a number of cases showing the crane in actual use. A partial list of users and a brief telegraph code are included.

**Saws.**—Henry Disston & Sons, Inc., P. O. Box 1537, Philadelphia, Pa. Pamphlet entitled "Why a Saw Cuts." Calls attention to the way in which wood is cut by a saw and demonstrates that the cutting action is based on scientific principles. A number of illustrations showing the position and arrangement of the saw teeth and the way in which they cut the wood are included. The steps entering into the manufacture of a saw are listed and a number of engravings of the various departments are presented.

**Facing Heads.**—Mummert-Dixon Company, Hanover, Pa. Folder. Deals with a facing head equipped with automatic feed for performing facing operations on a milling or vertical drilling machine, lathe or boring mill. A general description of the head, which is made in three sizes for handling work ranging from 6 to 12 in. in maximum diameter, is presented and a number of engravings of the head in use on different kinds of machines are included. This tool is designed to enable a wider range of sizes and greater variety of work to be handled than was possible with the facing head for a drilling machine, which was illustrated in *THE IRON AGE*, Jan. 7, 1915.

**Stellite.**—Haynes Stellite Company, Kokomo, Ind. Catalog No. 5. Illustrates and describes Stellite, its use and application as a high-speed cutting metal and its value for instruments, fine tools, cutlery, etc. This material is an alloy of semi-rare metals which resists oxidation or tarnishing, and after a brief statement of its various properties, its use in lathe and other metal working machine tools is gone into at some length. A list of the stock sizes in which the alloy can be supplied is given.

**Polishing Machine and Supplies.**—M. Wright & Son Estate, Putnamville, Vt. Catalog. Shows a line of stone polishing machines and supplies which include ironing and emery wheels, felt buffers, putty powder, etc. In connection with most of the articles listed very little text is given outside of specification tables, the engravings being relied upon to tell the story.

**Coal and Ore Tubs, Conveying Buckets and Appliances, etc.**—Biehl Iron Works, Reading, Pa. Catalog F. Contains illustrations, brief descriptions and specification tables of a line of coal and ore tubs, contractors' buckets, concrete carts and barrows, conveying buckets and appliances, and lead, tar and asphalt melting furnaces. In connection with some of the articles listed line drawings showing the construction are given as well as the halftone engravings.

**Heat Treating Ovens.**—Heco Mfg. Company, 144 Pearl Street, Boston, Mass. Pamphlet entitled "The 'Yes' and 'No' of Steel Tempering." Contains a discussion of the use of electric furnaces for drawing the temper of steel which is supplemented by an engraving of a standard oven with brief specifications of the various sizes that can be supplied.

**Cylinder Lubricant.**—E. F. Houghton & Co., Third, American and Somerset streets, Philadelphia, Pa. Pamphlet No. 8339. Relates to Cyl-tal, which is a concentrated lubricant for steam engine cylinders consisting of an artificial tallow especially prepared for the purpose. The advantages of using a tallow lubricant for this purpose are touched upon and a brief account of the development of the lubricant is given.

**Turbo Blowers, Air Compressors and Rock Drills.**—Ingersoll-Rand Company, 11 Broadway, New York City. Three bulletins. The first, No. 3029, describes a steam-driven duplex air compressor in which the steam cylinders are next to the frame and separated from the air cylinders by open distance pieces. The four different cylinder combinations that can be supplied are illustrated and the general description of the compressor itself is supplemented by numerous engravings of the various parts. Tables of sizes and capacities

are included. The second bulletin, No. 3036, treats of a turbo blower suitable for supplying air where the capacity requirements range from 3000 to 35,000 cu. ft. of free air per minute at pressures of from 1 to 2½ lb. Among the services for which these blowers are adapted are foundry cupola blowing, atomizing oil for oil blowers, supplying blast for various kinds of heating and annealing furnaces, blowing air for water gas generators, pneumatic conveying systems and for ventilating purposes. The last bulletin, No. 4120, superseding Nos. 4020 and 4034, explains the construction of a water rock drilling machine in considerable detail. The special features of the drill are the application of air and water to the bottom of the hole and the securing of a blow that is comparable to that of hand hammer mechanically applied. Numerous views of the drill in service are included.

**Cranes, Steam Drop Hammers and Special Machinery.**—Alliance Machine Company, Alliance, Ohio. Catalog. Size, 8 x 11 in.; pages, 94. Illustrates an extensive line of cranes for various purposes, steam drop hammers and special machinery. There is practically no text in the catalog, the engravings of the various pieces of apparatus being relied upon to tell the story. In the captions the principal features are summarized briefly and mention is made of the plants in which the apparatus is installed. A list of users giving the number of pieces of apparatus bought by each is included.

**Heavy Duty Lathes.**—Shook & Fletcher Supply Company, Inc., Birmingham, Ala. Circular. Pertains to a 20-in. heavy duty manufacturing lathe, which was illustrated in *THE IRON AGE*, Dec. 16, 1915. The construction of the lathe is described at some length and is arranged like a specification with marginal headings for the different parts at the left and a series of one-sentence paragraphs at the right. A condensed set of specifications of the tool, which was designed for turning out projectiles having a finished diameter of 9 in. or less, is given and an illustration of the machine is included.

**Triplex Plunger Pumps.**—Scranton Pump Company, Scranton, Pa. Bulletin No. 107. Lists a line of triplex plunger pumps of the vertical sectional water end type for mine pumping, waterworks, elevator service, etc. The construction of the pump, which can be used for medium lifts to a height of 500 ft., is described at some length, the text being supplemented by engravings of the various parts. A specification table and numbered list of repair parts are included.

**Conveying Machinery.**—Link-Belt Company, Thirty-ninth Street and Stewart Avenue, Chicago, Ill. Booklet No. 267, entitled "Moving Material Indian File." Embodies illustrations of conveying machinery for handling different classes of material with a general discussion of the problems involved in conveying separate pieces from floor to floor or piece by piece haulage at the same level. The adaptability of the various types of apparatus for the work illustrated is discussed at some length.

**Flexible Grinding Machine.**—Stow Mfg. Company, Binghamton, N. Y. Bulletin No. 33. Describes an adjustable, flexible grinding machine that has been built especially for the steel industry and allied trades. The outfit consists of a motor and shaft mounted on a truck which makes it readily portable while the power is transmitted through a flexible shaft to the grinding wheel. The various features of the machine, such as rugged construction, methods of securing speed variation, etc., are briefly touched upon. An illustration of the machine, which was described in *THE IRON AGE*, Dec. 9, 1915, is also presented.

**Gate Valves.**—Nelson Valve Company, Chestnut Hill, Philadelphia, Pa. Catalog. Concerned with a line of extra heavy steel gate valves for superheated steam and other power plant service. The various steps in the manufacture of these valves are briefly described with a number of illustrations, and this is followed by engravings with brief descriptions and specification and dimension tables of various types of valves with monel metal mountings. The valves listed include the double disk and solid wedge types for various pressures up to 350 lb. per square inch.

**Wire Rope.**—John A. Roebling's Sons Company, Trenton, N. J. Vol. 1, No. 2 of "Roebling's Wire Rope." This is a new house organ designed to impart information of service to wire-rope users. A number of articles citing examples of good wire-rope practice are included, and special attention is given to the care and proper use of wire rope in service.

**Traveling Water-Intake Screens.**—Link-Belt Company, Thirty-ninth Street and Stewart Avenue, Chicago, Ill. Bulletin No. 229. Gives a brief description with illustrations of a traveling water-intake screen to prevent driftwood, vegetation and miscellaneous trash from entering condenser intake pipes. The special advantage claimed for the traveling screen is that the expense of cleaning has been done away with. A diagram showing the way in which these screens are installed is included, and an illustration of one of the screens is given with the various advantages pointed out.

